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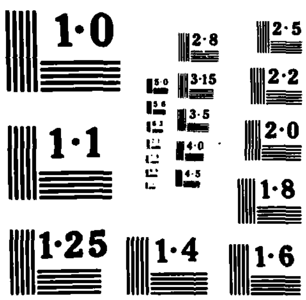
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STUDY OF AEROSPACE MATERIALS, COATINGS, ADHESIONS AND PROCESSES

Aircraft Icing Processes

1st. Volume

Principal Investigator:
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INTA. Torrejón de Ardoz.
(Madrid). Spain.

14 September 1984

Final Scientific Report, 15 Sept.1983-14 Sept.1984

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London, England.

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Larell K. Smith

LARELL K. SMITH, Major, USAF
Chief, Physics/Physical Chemistry

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INTA has been provided with a versatil FORTRAN Program that permits a full analysis of the trajectories described by the droplets of a cloud with respect to an infinitely long body, any cross section, moving inside it normally to its span.

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NOTE

This 1st Volume refers exclusively to the Primary Aim (Theoretical Study of the Trajectories: Mathematical Model, FORTRAN Program and Sets of Results) included in the Second Year Proposal submitted to the European Office of Aerospace Research and Development, in February, 1983, that produced Grant NO. AFOSR-83-0340 as a continuation of the Grant NO. AFOSR-82-0316.

The work done referring to the Secondary Aim (Icing Simulator and Metering System) is to be presented in a separated Second Volume.

Grant NO. AFOSR-83-0340

STUDY OF AEROSPACE MATERIALS, COATINGS, ADHESIONS AND PROCESSES

Aircraft Icing Processes

Primary Aim

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14 September 1984

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I must express also my gratitude to my wife, for her lovely patience all along these two years of work.

Introduction

The main purpose conducting the work implied in this report is to provide INTA with a set of computer programs, included in a coherent system for analyzing aircraft icing phenomena, as a necessary help to the aeronavegability certification responsabilities of this national spanish Institute.

In particular, this report concerns to a second phase in which a computer program, that provides the trajectories of the droplets of a cloud when a two-dimensional body of any cross section moves normally to its axis, is established considering the case in which the Stokes Law for the motion of an sphere is applicable, as well as the case in which that law is not applicable due to the higer Reynolds numbers involved. In both cases the assumptions made have been the following:

- Low concentration of particles, in such a way that the flow-field of the air is not affected by the presence of the particles.
- The effect of gravity is negligible.
- The effect of compressibility is negligible.
- The effect of the boundary layer is negligible.
- Incompressible, potential flowfield. No circulation.

The trajectories described by the droplets with respect to the section are presented, graphically, in a normalized pattern in which the maximum dimension of the section in the drawing is always approximately the same whatever the dimensions of the real body may be. Nevertheless, the point where the trajectories start can be selected outside the enclosing frame, which is also always the same.

A-1/082.3 Imprenta del INTA

Mathematical Model

To establish a M.M., corresponding to the trajectories that the droplets of a cloud describe with respect to a two-dimensional body which approaches moving normally to its axis, is the first step of the Primary Aim established in the November 1981 INTA Proposal.

We have established one such Mathematical Model, analyzing the relations existing between the principal variables implied in the physical phenomenon of the motion of the droplets under the actions of the viscous and inertial forces.

The M.M. has been established considering two different cases, according to the possibility of applying the Stokes Law. This possibility depends upon the value of the Reynolds number that needs to be calculated in each one of the steps in which each one of the trajectories is divided for its calculation

The calculations start from a point that we can select arbitrarily at such a distance of the profile that permits to suppose reasonably that the perturbation of the air at this point, due to the motion of the body, is neglectable.

Though, in both cases, we establish the set of equations with a notation usual in Physics, afterwards in both cases, we make a change to an intermediate notation, by capital letters, as an approximation to the final notation to be employed in the FORTRAN Program that constitutes the second step of the Primary Aim of the Proposal.

A-1/002.3 Imprenta del INTA

Case in which Stokes Law is applicable

When the profile moves in the air, it produces in each point of the fluid an induced wind, which can be represented by a vector. The difference between this vector and the vector representing the absolute velocity of the droplet considered, is another vector $\vec{U}$ which represents the relative velocity between the air and the droplet. This relative velocity produces on the spherical droplet of diameter "d" a force $\vec{f}$ given by the Stokes Law:

$$f=3\pi\mu Ud \qquad (1)$$

where μ is the viscosity of the air. This force has the same direction and sense that the relative velocity. Then we can write:

$$\vec{f}=3\pi\mu\vec{U}d \qquad (2)$$

This force, by the other hand and according to the Newton's Second Law, produces an acceleration of the droplet given by the expression:

$$\vec{f}=m\cdot\vec{a} \qquad (3)$$

where m is the mass of the droplet:

$$m=\text{Volume}\cdot\text{density}=\frac{4}{3}\pi\left(\frac{d}{2}\right)^3\cdot\rho_G$$

$$m=\frac{\pi}{6}\cdot\rho_G\cdot d^3 \qquad (4)$$

From (2),(3) and (4) results:

$$3\pi\mu\vec{U}d=\frac{\pi}{6}\rho_G\cdot d^3\cdot\vec{a}$$

$$\frac{18\mu}{\rho_G d^2}\cdot\vec{U}=\vec{a} \qquad (5)$$

When the viscosity μ, the density of the droplet ρ_G and the diameter "d" of the droplet can be considered constants, the expression preceeding U can be represented by a constant B, an then, results the very simple vectorial expression:

$$B\cdot\vec{U}=\vec{a} \qquad (6)$$

equivalent to the set:

$$B\cdot U_x=a_x$$

$$B\cdot U_y=a_y$$

If we consider an interval of time dt , and we denominate:

u_{xf} , u_{yf} = components of the absolute velocity u_f of the fluid at the end of the interval.

Au_{xf} , Au_{yf} = Idem at the beginning of te interval.

u_{xg} , u_{yg} = components of the absolute velocity u_g of the droplet at the end of the interval.

Au_{xg} , Au_{yg} = Idem at the beginning of the interval.

the component "x" of the mean relative velocity is given by the expression:

$$u_x = \left[\left(Au_{xf}-Au_{xg}\right)+\left(u_{xf}-u_{xg}\right)\right]/2 \qquad (9)$$

equivalent to:

$$u_x = \left(Au_{xf}- 2\ Au_{xg} + u_{xf} - du_{xg}\right)/2 \qquad (10)$$

because

$$u_{xg} = Au_{xg} + du_{xg} \qquad (11)$$

Reasoning in a similar manner to the "y" axis results:

$$u_y = \left(Au_{yf}- 2\ Au_{yg} + u_{yf} - du_{yg}\right)/2 \qquad (12)$$

with

$$u_{yg} = Au_{yg} + du_{yg} \qquad (13)$$

The increment du_{xg} relates with the acceleration a_x and the increment dt in time by the expression:

$$a_x = du_{xg}/dt \qquad (14)$$

and similary:

$$a_y = du_{yg}/dt \qquad (15)$$

The space traveled by the droplet along the x axis during the time dt cannot be expressed by the simple formula $dx_g = Au_{xg} \cdot dt$ because there are zones at which the velocity has a very low value. It is necessary to use the more complicated expression:

$$dx_g = Au_{xg} \cdot dt + \frac{1}{2} \cdot a_x \cdot dt^2 \qquad (16)$$

and similary:

$$dy_g = Au_{yg} \cdot dt + \frac{1}{2} \cdot a_y \cdot dt^2 \qquad (17)$$

Equations (16) and (17), using (14) and (15) can be presented as:

$$dx_g = \left(Au_{xg} + \frac{du_{xg}}{2}\right) \cdot dt \qquad (18)$$

$$dy_g = \left(Au_{yg} + \frac{du_{yg}}{2}\right) \cdot dt \qquad (19)$$

or:

$$dt = \frac{2 \cdot dx_g}{2 \cdot Au_{xg} + du_{xg}} \qquad (20)$$

$$dt = \frac{2 \cdot dy_g}{2\ Au_{yg} + du_{yg}} \qquad (21)$$

Substituting this expressions of dt in (14) and (15) results:

$$a_x = du_{xg} \cdot \left(2 \cdot Au_{xg} + du_{xg}\right) / \left(2 \cdot dx_g\right) \qquad (22)$$

$$a_y = du_{yg} \cdot \left(2 \cdot Au_{yg} + du_{yg}\right) / \left(2 \cdot dy_g\right) \qquad (23)$$

By substitution of expressions (10) and (22) in expression (7) we have:

$$B \cdot \left(Au_{xf} - 2\ Au_{xg} + u_{xf} - du_{xg}\right) \cdot dx_g = \\ = du_{xg} \cdot \left(2 \cdot Au_{xg} + du_{xg}\right) \qquad (24)$$

Similary we have:

$$B \cdot \left(Au_{yf} - 2 \cdot Au_{yg} + u_{yf} - du_{yg}\right) \cdot dy_g \qquad (25)$$

If we select as direction of the x axis that of the motion of the profile, the ordenate y_n of the profile results a constant and its increment dy_n is always zero, then results that the increment dy_g of the absolute ordenate y_g of the droplet is equal to the increment dy_{gn} of the relative ordenate y_{gn} of the droplet with respect to the profile :

$$dy_g = dy_{gn} \qquad (26)$$

$$y_g = y_{gn} \qquad (27)$$

A-4/002.3 Imprenta del INTA

In order to obtain the air velocity components due to the motion of the profile inside the cloud, in the sense of the X axis, we had proposed to use the expressions given at the next page for the two components V_x and V_y. Those expressions produce results, concerning non-steady flow, that can be directly related to the results produced by the well known expressions:

$$u_r = U_0 \cdot \left[\left(\frac{a_0}{r} \right)^2 - 1 \right] \cdot \cos \vartheta \qquad (28)$$

$$u_\vartheta = U_0 \cdot \left[\left(\frac{a_0}{r} \right)^2 - 1 \right] \cdot \sin \vartheta \qquad (29)$$

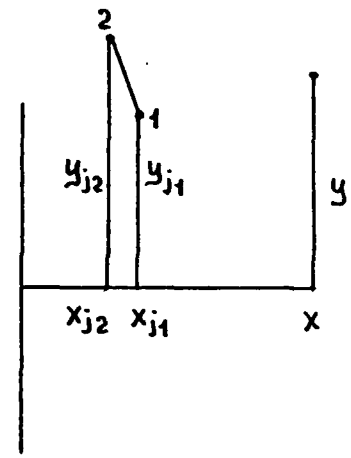
that provide the relative velocity components u and u in cylindrical coordenates (r, ϑ) of the air with free stream velocity U_0, due to the presence of a cylinder of radius a_0.

The agreement between the results produced by these two different methods is excellent. Nevertheless, when the given expressions for V_x and V_y are applied to a sheet of zero thickness, like the case of an infinitely long sheet of paper, the calculated components of the air velocity result both zero. This inconvenience do not appears when the expressions of V_x and V_y are applied only to the segments that are sighted from the point (x,y) at which the velocity is being calculated. This is the reason why an "Non Sighted Segments Factor" (NSSF) has been introduced in the calculations. The value of NSSF can be selected for each trajectory from zero to one, and indicates de degree of effect in the results of the segments that, though implicated in the definition of the profile, are not sighted from the (x,y) point.

The selection by the operator of the value of

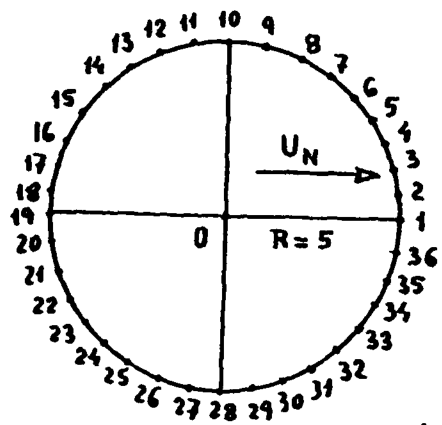
$$V_x = \frac{U_N}{\pi}\left[\sum \frac{(x-x_{Fj})\cdot|y_{j2}-y_{j1}|}{(x-x_{Fj})^2+(y-y_{Fj})^2} - \sum \frac{(x-x_{sj})\cdot|y_{j2}-y_{j1}|}{(x-x_{sj})^2+(y-y_{sj})^2}\right] \tag{30}$$

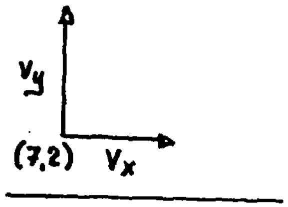
$$V_y = \frac{U_N}{\pi}\left[\sum \frac{(y-y_{Fj})\cdot|y_{j2}-y_{j1}|}{(x-x_{Fj})^2+(y-y_{Fj})^2} - \sum \frac{(y-y_{sj})\cdot|y_{j2}-y_{j1}|}{(x-x_{sj})^2+(y-y_{sj})^2}\right] \tag{31}$$



Velocity components of the fluid.

Example: Cylinder ($R = 5$) moving with velocity U_N in the $\vec{x}$ direction. Air velocity in (7,2).

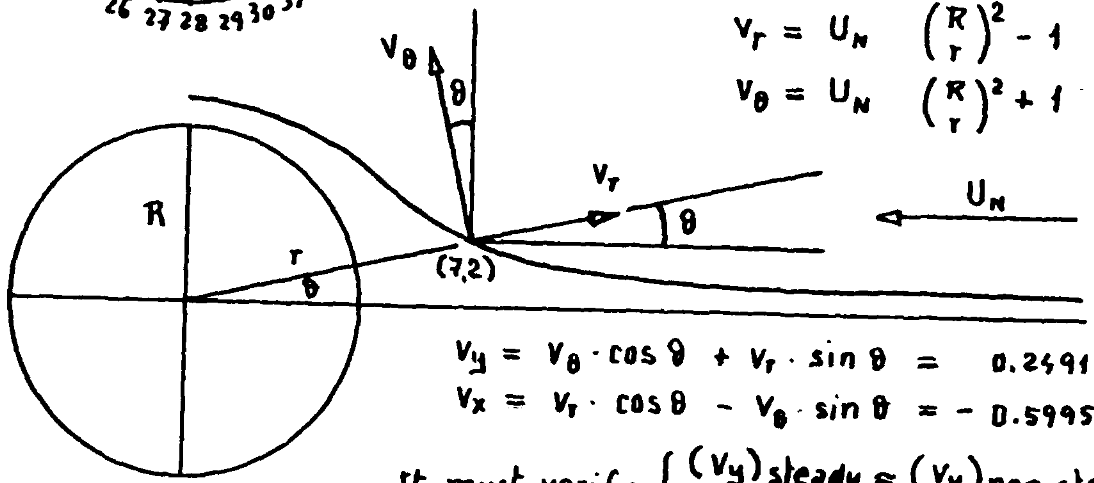




$$\left.\begin{aligned} V_y &= 0.2488815 \cdot U_N \\ V_x &= 0.4076202 \cdot U_N \end{aligned}\right\} \text{ non-steady flow}$$

$$V_r = U_N \quad \left(\frac{R}{r}\right)^2 - 1 \quad \cos\vartheta = -0.507949 \cdot U_N$$

$$V_\theta = U_N \quad \left(\frac{R}{r}\right)^2 + 1 \quad \sin\vartheta = 0.4043065 \cdot U_N$$



$$\left.\begin{aligned} V_y &= V_\theta \cdot \cos\vartheta + V_r \cdot \sin\theta = 0.249199 \cdot U_N \\ V_x &= V_r \cdot \cos\theta - V_\theta \cdot \sin\theta = -0.5995015 \cdot U_N \end{aligned}\right\} \text{ steady flow}$$

It must verify $\left\{\begin{aligned} &(V_y)_{\text{steady}} \approx (V_y)_{\text{non-steady}} && \text{O.K.} \\ &(V_x)_{\text{non-steady}} \approx (V_x)_{\text{steady}} + U_N && \text{O.K.} \end{aligned}\right.$

A-4/002.3 Imprenta del INTA

NSSF is made, like the values of other parameters, by conversation between the operator and the computer.

The NSSF value is printed before the initiation of each trajectory, due to its great influence on the results.

It is expected to determine experimentally, in future research, the values of NSSF that fits better to the different types of profiles (sheets, cylinders, airfoils, etc.) to be considered, and perhaps the relative distance to the profile.

A-4/802.3 Imprenta del INTA

There are two expressions that concerns to the relations between geometrical variables:

$$Ax_{gn} + dx_g = dx_n + x_{gn} \qquad (32)$$

$$Ay_{gn} + dx_g = dy_n + y_{gn} \qquad (33)$$

As we have said, if we select as direction of the x axis that of the motion of the profile results:

$$dy_n = 0 \qquad (34)$$

Finally, the space traveled along the x axis by the profile during dt is given by:

$$dx_n = U_n \cdot dt \qquad (35)$$

As a result of all the preceeding reasoning, we can establish the following set of equations as representative of the motion of the droplets of the cloud produced by the motion of the profile in it :

$$B \cdot (Au_{xf} - 2\, Au_{xg} + u_{xf} - du_{xg}) \cdot dx_g = $$
$$= du_{xg} \cdot (2 \cdot Au_{xg} + du_{xg}) \qquad (36)$$

$$B \cdot (Au_{yf} - 2 \cdot Au_{yg} + u_{yf} - du_{yg}) \cdot dy_g = $$
$$= -du_{yg} \cdot (2 \cdot Au_{yg} + du_{yg}) \qquad (37)$$

$$u_{xf} = u_{xf}\ (x_{gn}\ ,\ y_{gn}) \qquad (38)$$

$$u_{yf} = u_{yf}\ (x_{gn}\ ,\ y_{gn}) \qquad (39)$$

$$Ax_{gn} + dx_g = dx_n + x_{gn} \qquad (40)$$

$$Ay_{gn} + dy_g = dy_n + y_{gn} \qquad (41)$$

$$dx_n = U_n\ dt \qquad (42)$$

$$dy_n = 0 \qquad (43)$$

$$dt = 2 \cdot dx_g \,/ \left(2\ Au_{xg} + du_{xg} \right) \qquad (44)$$

$$dt = 2 \cdot dy_g \,/ \left(2\ Au_{yg} + du_{yg} \right) \qquad (45)$$

This is a set of 10 equations which permits to calculate the values of the 10 variables:

u_{xf}	du_{xg}	dx_g	dx_n	----	dt
u_{yf}	du_{yg}	dy_g	dy_n	dy_{gn}	----

at the point corresponding to an increment dx_{gn} in the relative distance between the droplet and the profile , if the values:

$$
\begin{array}{ccc}
Au_{xf} & Au_{xg} & Ax_{gn} \\
Au_{yf} & Au_{yg} & Ay_{gn}
\end{array}
$$

corresponding to the actual point of the trajectory are known.

This set of equations permits to calculate, from a set of initial values, all the trajectory, step by step, whereas the hypothesis about the validity of the application of the Stokes Law be correct.

In order to solve by computer the preceeding set of equations, we can introduce some transformations in it :

First of all we shall introduce a new notation, with capital letters, selfcomprehensive, by which the preceeding set of equations can be written as:

$$B*(AUXF-2*AUXG+UXF-DUXG)*DXG = = DUXG*(2*AUXG+DUXG) \quad (46)$$

$$B*(AUYF-2*AUYG+UYF-DUYG)*DYG = = DUYG*(2*AUYG+DUYG) \quad (47)$$

$$UXF = UXF\ (XGN,YGN) \quad (48)$$

$$UYF = UYF\ (XGN,YGN) \quad (49)$$

$$AXGN+DXG = DXN+XGN \quad (50)$$

$$AYGN+DYG = DYN+YGN \quad (51)$$

$$DXN = UN*DT \quad (52)$$

$$DYN = 0 \quad (53)$$

$$DT = 2*DXG\ /\ (2*AUXG+DUXG) \quad (54)$$

$$DT = 2*DYG\ /\ (2*AUYG+DUYG) \quad (55)$$

Taking into account that XGN - AXGN = DXGN , the equation (50) can be presented as:

$$DXN = DXG - DXGN \quad (56)$$

A-4/002.3 Imprenta del INTA

From (51) and (53) results :

YGN = AYGN + DYG (57)

From (52) results :

DT = DXN / UN (58)

From (54) and (55) results :

DYG = DXG*(2*AUYG+DUYG)/(2*AUXG+DUXG) (59)

From (54) and (58) results :

DXN/UN = 2*DXG/(2*AUXG+DUXG) (60)

By substitution of DXN in the preceeding equation for its expression obtained from (50) results :

$$DXG = \frac{(AXGN - XGN)*(2*AUXG + DUXG)}{2*UN - 2*AUXG - DUXG} \qquad (61)$$

From (59) and (61) results :

$$DYG = \frac{(AXGN - XGN)*(2 \cdot AUYG + DUYG)}{2*UN - 2*AUXG - DUXG} \qquad (62)$$

We will establish the new variable :

$$FACX = \frac{AXGN - XGN}{2*UN - 2\ AUXG - DUXG} \qquad (63)$$

equivalent to :

$$FACX = \frac{-DXGN}{2*UN - 2*AUXG - DUXG} \qquad (64)$$

From (61) and (63) results :

DXG = FACX*(2*AUXG + DUXG) (65)

From (62) and (63) results :

DYG = FACX*(2*AUYG + DUYG) (66)

A-4/003.3 Imprenta del INTA

From (46),(47) and (59) results :

$$DUYG = \frac{AUYF - 2 \cdot AUYG + UYF}{AUXF - 2 \cdot AUXG + UXF} \cdot DUXG \qquad (67)$$

We can establish the new variables :

$$BN = B \cdot (AXGN - XGN) + 2 \cdot UN - 2 \cdot AUXG \qquad (68)$$

$$CF = B \cdot (AUXF - 2 \cdot AUXG + UXF) \cdot (AXGN - XGN) \qquad (69)$$

where :

$$AXGN - XGN = -DXGN \qquad (70)$$

Then, from (46) and (61) and taking into account (68) and (69) results :

$$DUXG = \frac{BN \pm \sqrt{BN^2 - 4 \cdot CF}}{2} \qquad (71)$$

We can now solve the set of equations by the following iterative process, once established the value of DXGN :

- Calculate XGN = AXGN + DXGN
- Suppose a value of DYG
- Calculate YGN = AYGN + DYG
- Calculate the components UXF,UYF of the air velocity at the point XGN,YGN.
- Calculate BN and CF by (68) and (69).
- Calculate DUXG by (71).
- Calculate FACX by (64).
- Calculate DUYG by (67).
- Calculate DYG by (66).
- Compare the DYG calculated with the DYG supposed and tray a new DYG , adequately chosen, till the difference between the DYG calculated and the DYG supposed be little enough.
- Once determined the correct value of DYG , calculate the remaining variables :

- DYGN = DYG
- DXG by (65)
- XG = AXG DXG

Etc.

A-4002.3 Imprenta del INTA

Set of equations for the general case

For the general case (GC) in which Stokes Law can not necessary be applicable, we have established the following set of equations:

$$x_g = Ax_g + dx_g \tag{72}$$

$$y_g = Ay_g + dy_g \tag{73}$$

$$x_n = Ax_n + dx_n \tag{74}$$

$$y_n = Ay_n + dy_n \tag{75}$$

$$x_{gn} = Ax_{gn} + dx_{gn} \tag{76}$$

$$y_{gn} = Ay_{gn} + dy_{gn} \tag{77}$$

$$x_{gn} = x_g - x_n \tag{78}$$

$$y_{gn} = y_g - y_n \tag{79}$$

$$dx_n = U_n \cdot dt \tag{80}$$

$$dy_n = 0 \tag{81}$$

$$dx_g = Au_{xg} \cdot dt + \frac{1}{2} \cdot a_{xg} \cdot dt^2 \tag{82}$$

$$dy_g = Ay_{xg} \cdot dt + \frac{1}{2} \cdot a_{yg} \cdot dt^2 \tag{83}$$

$$du_{xg} = a_{xg} \cdot dt \tag{84}$$

$$du_{yg} = a_{yg} \cdot dt \tag{85}$$

$$u_{xf} = u_{xf}\,(x_{gn}\,,\,y_{gn}) \tag{86}$$

$$u_{yf} = u_{yf}\,(x_{gn}\,,\,y_{gn}) \tag{87}$$

$$Ux = \left(\left(u_{xf} - u_{xg}\right) + \left(Au_{xf} - Au_{xg}\right)\right) / 2 \tag{88}$$

$$U_y = \left(\left(u_{yf} - u_{yg}\right) + \left(Au_{yf} - Au_{yg}\right)\right) / 2 \tag{89}$$

$$f_x = \pm\, C_{Dx} \cdot \frac{1}{2} \rho_f \cdot U_x^2 \cdot A \tag{90}$$

$$f_y = \pm\, C_{Dy} \cdot \frac{1}{2} \rho_f \cdot U_y^2 \cdot A \tag{91}$$

$$f_x = m_g \cdot a_{xg} \tag{92}$$

$$f_y = m_g \cdot a_{yg} \tag{93}$$

A-1/882.3 Imprenta del INTA

$$C_{Dx} = C_{Dx} \cdot \left(R_x \right) \tag{94}$$

$$C_{Dy} = C_{Dy} \cdot \left(R_y \right) \tag{95}$$

$$R_x = ABS \left(U_x \right) d_g / \nu \tag{96}$$

$$R_y = ABS \left(U_y \right) d_g / \nu \tag{97}$$

$$A = \pi \cdot r_g^2 = \frac{\pi}{4} \cdot d_g^2 \tag{98}$$

$$m_g = \frac{\pi}{6} \cdot \rho_g \cdot d_g^3 \tag{99}$$

The double signe $(\pm)$ indicates that the force acting on the droplet is not necessary an accelerating force. There are zones at which the air acts on the particle like a brake decelerating its motion. It was not necessary to take this double signe into account in the case of the Stokes Law because in that case the force depended directly upon the relative velocity U due to the particular expression of C_D versus Reynolds number. On the contrary, in the actual case, the signs of U_x and U_y are not directly transmitted to the forces f_x and f_y because U_x and U_y are squared and hence the necessity of the sign preceeding the expressions of the forces.

With respect to the expression of the drag coefficient, it is different according to the zone of the Reynolds number at which we are operating :

For Reynolds numbers from .1 till 1. we will use the Oseen's expression :

$$C_D = \frac{24}{R_e} + 4.5 \tag{100}$$

For Reynolds numbers greater than 1. we will use our own expression :

$$C_D = 10.^{\frac{(3.92494 - \log R_e)^2}{8.322698} - .4038228} \tag{101}$$

which is valid for Reynolds numbers from 1. till 2000.

To solve by computer the set of equations we shall make some arrengements:

First of all we shall put the set in the intermediate notation as follows:

```
XG = AXG + DXG                              (102)
YG = AYG + DYG                              (103)
XN = AXN + DXN                              (104)
YN = AYN + DYN                              (105)
XGN = AXGN + DXGN                           (106)
YGN = AYGN + DYGN                           (107)
XGN = XG - XN                               (108)
YGN = YG - YN                               (109)
DXN = UN * DT                               (110)
DYN = 0.                                    (111)
DXG = AUXG * DT + ACELX * DT**2./2.                  (112)
DYG = AUYG * DT + ACELY * DT**2./2.                  (113)
DUXG = ACELX * DT                           (114)
DUYG = ACELY * DT                           (115)
UXF = UXF ( XGN, YGN )                      (116)
UYF = UYF ( XGN, YGN )                      (117)
UX = ((UXF-UXG) + (AUXF-AUXG)) /2.                   (118)
UY = ((UYF-UYG) + (AUYF-AUYG)) /2.                   (119)
FUERX =±CDX * DEF * UX**2. * A /2.                   (120)
FUERY =±CDY * DEF * UY**2. * A /2.                   (121)
FUERX = MASSG * ACELX                       (122)
FUERY = MASSG * ACELY                       (123)
CDX = CDX (RX)                              (124)
CDY = CDY (RY)                              (125)
RX = ABS (UX)*DIAMEG / VISCI                         (126)
RY = ABS (UY)*DIAMEG / VISCI                         (127)
A = PI * DIAMEG**2. / 4.                             (128)
MASSG = PI * DEG * DIAMEG**3. / 6.                   (129)
CD = 24. / R + 4.5                                   (130)
CD = 10.**((3.92494-ALOG10(R))**2./8.322698
      - .4038228                                            (131)
```

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In order to give the diameter in microns and the fluid density in lb ft^{-3} , as desired, we will establish the coefficient :

$$COFU8 = (DEFI5/158824.)*(DIAMG/10.)**2. \qquad (132)$$

by which, the expression of the force FX multiplied by 10. to 8 results:

$$FUERX8 = \mp COFU8 * CDX * UX ** 2. \qquad (133)$$

For the Y axis we will obtain a similar expression of FUERY8 :

$$FUERY8 = \mp COFU8 * CDY * UY ** 2. \qquad (134)$$

These variables FUERX8 and FUERY8 will be used to calculate the accelerations ACELX and ACELY of the droplet along the X and Y axes respectively, resulting:

$$ACELX = 19.1 * FUERX8 / (DEG * (DIAMG/10.) ** 3.) \qquad (135)$$
$$ACELY = 19.1 * FUERY8 / (DEG * (DIAMG/10.) ** 3.) \qquad (136)$$

To calculate the relative velocity between the air and the droplet, we suppose that, for an interval littel enough, it is possible to neglect, in the expressions corresponding UX and UY, the differential terms DUXF/2. and DUYF/2. , resulting the following expressions :

$$UX = AUXF - AUXG - (ADUXG/2.) * DTGC / ADT \qquad (137)$$
$$UY = AUYF - AUYG - (ADUYG/2.) * DTGC / ADT \qquad (138)$$

Also would be possible to use the approximate expressions :

$$UX = AUX + DUX = AUX + ADUX * DTGC / ADT \qquad (139)$$
$$UY = AUY + DUY = AUY + ADUY * DTGC / ADT \qquad (140)$$

In all these expressions, the fraction DTGC/ADT takes care of the first step of this general case (GC) for which the value ADT of the preceeding DT has not necessarily the value DTGC supposed for all the steps in this GC.

In the case of FF=1. the rate of ice growing on the surface of the profile equals the water mass deposition rate (WMDR).

At the zone determined by the collision points (AXCP,AYCP) and (XCP,YCP) of two consecutive trajectories, the WMDR can be calculated, in grammes per minute and square centimeter by the expressions:

BASE=((AXCP-XCP)** 2.+ (YCP-AYCP)** 2.)**.5
WMDR=6.* RLWC*DYGNO* (UN/1000.)/(BASE*100.)

where the units to be used are those later indicated for each one of the variables.

These two expressions are included as lines 0850 and 0851 in the AIP07 Program to be taken into account in future expansions of this program.

The AIP07 FORTRAN Program

This is the program presented as a result of the research work performed during the period 15-Sept-83 / 14-Sept-84. It corresponds to the second year of work stated in the 1981 Proposal concerning Aircraft Icing. All the goals there established have been reached.

The fundamental difference between the AIP05 and the AIP07 programs lies in that the former can be applied only to cylindrical sections while the latter is applicable to sections of any shape.

The AIP07 program is submitted continuously to a process of revision in order to introduce new improvements. This is the reason why it presents groups of sentences concerning future developments.

Like the AIP05, the AIP07 program includes a great deal of logical sentences constituting like a matrix in which the calculating units are immersed, giving to the program a great versatility.

When starting the program it is possible to select the values of the following variables:

C= Chord of the profile (cm).
NS= Number of segments defining the section.
UNK= Body speed normal to its infinite span (Knots).
DEFI5= Air density (lb ft^{-3}) times 10 to 5.
ETAI5= Viscosity index of the air (lb ft^{-1} sec^{-1}) times 10 to 5 .
RLWC= LWC (grammes $meter^{-3}$) .
DIAMG= Droplet diameter (microns) .
DEG= Droplet density (grammes cm^{-3}) .
XGNO= Initial abscise of the droplet (cm).
DYGNO= For automatic case: Increment of the initial ordenate of the droplet in order to initiate a new trajectory (cm) .

Q= For the case in which Stokes Law is applicable: Number of steps of value DXGN contained in the initial abscise (= - XGNO/DXGN),(adimensional).

COTA = Tolerance in % permitted to calculate the solutions in the iterative processes.

YGNO = Initial ordenate of the droplet (cm) .

DTGC = Differential of time for the general case.

There are other questions that, though formulated, are not used in the AIP07 Program. They are put among the initial questions to be answered to the computer as a prevision for future expansions. These questions are the following:

COMPACT ICE DENSITY IN
GRAMMES/CUBIC CENTIMETER ? (DEHIC)
DENSITY RATIO ? (RDDE)

We can answer 1 to any of them to pass to the next question.

There are other questions concerning to the mode of operation:

It is possible to calculate one trajectory starting from any arbitrarily selected ordenate, then another one, etc. ("MANUAL MODE") on condition that we will answer 1. to the question "ONLY ONE TRAJECTORY ? ". Also it is possible to calculate automatically all the trajectories contained between two of initial ordenates YGNO and YGNOX and separated DYGNO at XGNO , each one to the next trajectory, on condition that initially we will answer 0. to the preceding question and we will establish the value of DYGNO when the computer asks for this value. If desired, that portion of the trajectories contained in the reference frame, can be drawn.

The constant section of the infinitely long body to be considered under the icing effect, can be defined, at a certain angle of attack, by the abscises and ordenates of up to 100 points, counterclockwise located on the profile. This values can be given by punched tape, free format, though, in the case of circumference or NACA four digits profile, the program has provisions for an internal generation of the defining points.

The AIP07 Program has also provisions to change, before starting the calculation of the trajectories, the angle of attack in any desired number of degrees with respect to the angle of attack at which the profile has been defined. If desired, the new coordenates of the defining points can be given by the computer to the operator in punched tape, FORMAT(2X,F10.3) . Both, the initial and the final, angles of attack, as well as the change, are printed as ALF, ALFA and DALF respectively.

The results provided by the computer consist of:

A)- The values of the established data:
C,NS,UNK,DEFI5,ETAI5,RLWC,DIAMG,DEG,
DEHIC,RDDE,XGNO,DYGNO.Q,COTA,SUT.YGNO.
LENS,SLFROM,SLUPTO,COUPLE,DTGC,PROFILE,
ALF,ALFA,YGNOX.

B)- The values of some auxiliary variables, calculated in the program, that can be useful to do some, always desirable, verifications:
UN = speed of the body (cm/sec) .
VISCI = kinematic viscosity (stoke) .
ETA5 = viscosity index (poise)
times 10. to 5.

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BEP = auxiliary variable, used for sizing the drawings.

GLU = auxiliary variable, with no special meaning, implicated in the Stokes case calculations.

XGNLP = left-hand abscise of the standard frame.

SW = signal of writing. It is used for tabulation each SW steps. Its value is Q/100.

COTO = per unit admisible error.

RLAMD = auxiliary variable, with no special meaning, implicated in the calculations of forces and accelerations.

COFU8 = Idem.

DALF = Difference between the desired and the initial angle of attack of the profile.

When we desire a number of decimals greater than the provided by the condensed (normal) table of results, we can obtain the values of the same variables under other format with more decimals, for the steps ranging between two steps, arbitrarily selected, of those composing the trajectory, on condition that we answer 1. to the question "LENS ?" and give the numbers of the initial and the final selected steps when the computer will ask "FROM STEP NUMBER ?" and "UP TO STEP NUMBER ?" respectively.

C)- The values of the variables at each step:

S = number of the step in the trajectory.

T = time in seconds.

XN = abscise of the profile (cm) .

XG = abscise of the droplet. (cm).

XGN = relative abscise of the droplet with respect to the profile (cm) .

YGN = ordenate of the droplet. (cm).

UXF = component X of the air velocity.(cm/sec)

UYF = component Y of the air velocity.(cm/sec)

UXG = component X of the droplet's velocity.

UYG = component Y of the droplet's velocity.

DXG = absolute space traveled by the droplet along X axis. (cm).

DXGN = relative spabe traveled by the droplet with respect to the profile (cm) .

DYG = absolute space traveled by the droplet along Y axis. (cm).

REYNM = Reynolds number. Mean value between the end and the beginning of the actual step.

D)- The drawing of the portion of the trajectory, or trajectories, contained inside the standard frame in which the standard profile is enclosed.

E)- Information about whether the droplet hits or not the profile. In the first case the legende "THE DROPLET HITS THE SURFACE" is printed. Otherwise the legende "XGNLP REACHED" is the one printed at the end of the tabulation when the droplet reaches the left hand side of the normalized frame.

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```
*AIP07 T=00004 IS ON CR00026 USING 00120 BLKS R=0000

FTN4X
      PROGRAM AIP07
C
C     AIRCRAFT ICING PROCESSES. RESEARCH PROGRAM. INTA.
C     AUTOR: DR.E.MONTIEL R. .ON BOARD INSTRUMENTS,
C     PROTECTION AND RESCUE SECTION. AERODYNAMICS
C     AND NAVEGABILITY DEPARTMENT. INTA. SPAIN.
C     THE A.I.P. RESEARCH PROGRAM IS SPONSORED BY
C     THE AIRFORCE OFFICE OF SCIENTIFIC RESEARCH.
C     GRANT NO. AFOSR-83-0340.
C     WITH THE COLLABORATION OF THE COMPUTERS
C     LABORATORY OF THE FLIGHT TEST SECTION.
C     THIS PROGRAM CALCULATES THE TRAJECTORIES, OF THE
C     DROPLETS, PRODUCED BY THE MOTION INSIDE A CLOUD
C     OF AN INFINITELY LONG BODY, WHICH CONSTANT CROSS
C     SECTION IS DEFINED, AT A CERTAIN ANGLE OF ATTACK, BY
C     THE ABSCISES AND ORDENATES OF UP TO 100 POINTS,
C     COUNTERCLOCKWISE LOCATED ON THE PROFILE.
C     THIS POINTS CAN BE GIVEN BY PUNCHED TAPE.
C     THE LAST POINT MUST BE COINCIDENT WITH THE FIRST ONE.
C     FOR THE CALCULATIONS THE PROFILE IS APPROXIMATED BY
C     A POLIGONAL LINE COMPOSED BY SEGMENTS LIMITED BY
C     THE GIVEN POINTS. BE AWARE: THE NUMBER OF THE POINTS
C     EXCEEDS ALWAYS IN ONE TO THAT OF THE SEGMENTS.
C     WHEN THE PROFILE IS A CIRCUMFERENCE OR A NACA FOUR
C     DIGITS, THE PROGRAM HAS PROVISIONS FOR AN INTERNAL
C     GENERATION OF THE DEFINING POINTS.
C     IF DESIRED, THE VALUES OF THE MOST IMPORTANT
C     VARIABLES, CALCULATED STEP BY STEP ALONG EACH
C     TRAJECTORY, CAN BE TABULATED.
C     IF DESIRED,EACH TRAJECTORY CAN BE DRAWN.
C     IN CASE OF INPINGEMENT, THE LEGENDE "THE DROPLET
C     HITS THE SURFACE." IS PRINTED. OTHERWISE THE
C     LEGENDE AT THE END OF THE TABULATION IS "XGNLP
C     REACHED."
C     IF THE AUTOMATIC MODE IS SELECTED A WHOLE
C     SET OF TRAJECTORIES IS OBTAINED BETWEEN
C     THE STATED LIMITS. IN MANUAL MODE, EACH
C     TRAJECTORY MUST BE SELECTED BY THE OPERATOR.
      DIMENSION A(100),B(100),XX(100),YY(100)
      COMMON/COM2/X(100),Y(100)
      PI=3.141592
      WRITE(12)0,1,0,1500
      WRITE(12)1,1,9999,1500
      WRITE(12)1,1,9999,8500
      WRITE(12)1,1,0,8500
      WRITE(12)1,1,0,1500
      WRITE(12)0,1,0,5000
      WRITE(1,10)
10    FORMAT(2X,"CYLINDER ? ANSWER: YES=1. NO=0.")
      READ(1,*) ESCYL
      IF(ESCYL.GT.0.5) GO TO 190
20    WRITE(1,30)
30    FORMAT(2X,"NACA FOUR DIGITS PROFILE ?",
     *" ANSWER: YES=1. NO=0.")
      READ(1,*) ESN4D
      IF(ESN4D.GT.0.5) GO TO 270
40    NUMBER=0.
```

```
      CDATO=0.
      WRITE(1,50)
50    FORMAT(2X,"NUMBER OF SEGMENTS ?")
      READ(1,*) NS
      N=NS+1
      WRITE(1,60)
60    FORMAT(2X,"ANGLE OF ATTACK AT WHICH",
     *" THE PROFILE IS DEFINED (DEGREES) ?")
      READ(1,*) ALF
      WRITE(1,70)
70    FORMAT(2X,"ABSCISES,ORDENATES ? (CM)")
      READ(5,*)(A(I),I=1,100)
      READ(5,*)(O(K),K=1,100)
90    AI=A(1)
      DO 110 J=2,N
      IF(A(J)-AI)100,110,110
100   AI=A(J)
      JAI=J
      OAI=O(J)
110   CONTINUE
      AD=A(1)
      DO 130 J=2,N
      IF(A(J)-AD)130,130,120
120   AD=A(J)
      JAD=J
      OAD=O(J)
130   CONTINUE
      OI=O(1)
      DO 150 J=2,N
      IF(O(J)-OI)140,150,150
140   OI=O(J)
      JOI=J
      AOI=A(J)
150   CONTINUE
      OS=O(1)
      DO 170 J=2,N
      IF(O(J)-OS)170,170,160
160   OS=O(J)
      JOS=J
      AOS=A(J)
170   CONTINUE
      OO=(OS+OI)/2.
      AO=(AD+AI)/2.
      DIAG=SQRT((AD-AI)**2.+(OS-OI)**2.)
      C=DIAG
      DO 180 J=1,N
      XX(J)=A(J)-AO
180   YY(J)=O(J)-OO
      GO TO 470
190   NUMBER=0.
      WRITE(1,200)
200   FORMAT(2X,"INTERNAL GENERATION ?",
     *" ANSWER: YES=1. NO=0.")
      READ(1,*) DIG1
      IF(DIG1.GT.0.5) GO TO 210
      GO TO 40
210   WRITE(1,220)
220   FORMAT(2X,"DIAMETER (CENTIMETERS) ?")
      READ(1,*) C
      CDATO= 1.
```

```
      A0=C/2.
      WRITE(1,230)
230   FORMAT(2X,"NUMBER OF SEGMENTS ? ",
     *"(LEATER THAN 100)")
      READ(1,*) NS
      N=NS+1
      ZETI=2.*PI/NS
      A(1)=A0
      O(1)=0.
      J=1
      DO 240 I=1,NS
      J=J+1
      A(J)=A0*COS(ZETI*I)
240   O(J)=A0*SIN(ZETI*I)
      WRITE(1,250)
250   FORMAT(2X,"ANGLE OF ATTACK AT WHICH",
     *" THE CYLINDER IS DEFINED (DEGREES) ?")
      READ(1,*) ALF
      DO 260 J=1,N
      XX(J)=A(J)
260   YY(J)=O(J)
      GO TO 470
270   WRITE(1,280)
280   FORMAT(2X,"INTERNAL GENERATION ?",
     *" ANSWER: YES=1. NO=0.")
      READ(1,*) DIG2
      IF(DIG2.GT.0.5) GO TO 290
      GO TO 40
290   WRITE(1,300)
300   FORMAT(2X,"NUMBER OF THE PROFILE ?",
     *" (FOR EXAMPLE: 2409)")
      READ(1,*) NUMBER
310   WRITE(1,320)
320   FORMAT(2X,"CHORD ? (CM)")
      READ(1,*) C
      CDATO=1.
330   WRITE(1,340)
340   FORMAT(2X,"ANGLE OF ATTACK AT WHICH THE",/,
     *"  PROFILE IS DEFINED (DEGREES) ? . ANSWER: 0.")
      READ(1,*) ALF
      L1=IFIX(NUMBER/1000.)
      K3=NUMBER-1000*L1
      L2=IFIX(K3/100.)
      K2=K3-100*L2
      YA=L1*C/100.
      XA=L2*C/10.
      THICK=K2*C/100.
      DELTX=C/20.
      X=-DELTX
      DO 450 J=1,50
      E1=(3./4.-1./200.)*C-X
      IF(E1.GT.0) GO TO 350
      E2=(7./8.-1./400.)*C-X
      IF(E2.GT.0) GO TO 360
      E3=(15./16.-1./800.)*C-X
      IF(E3.GT.0) GO TO 370
      E4=(31./32.-1./1600.)*C-X
      IF(E4.GT.0) GO TO 380
      E5=(63./64.-1./3200.)*C-X
      IF(E5.GT.0) GO TO 390
```

```
      E6=(127./128.-1./6400.)*C-X
      IF(E6.GT.0) GO TO 400
      DELTX=C/1152
      GO TO 410
350   DELTX=C/20.
      GO TO 410
360   DELTX=C/40.
      GO TO 410
370   DELTX=C/80.
      GO TO 410
380   DELTX=C/160.
      GO TO 410
390   DELTX=C/320.
      GO TO 410
400   DELTX=C/640.
410   X=X+DELTX
      BET=C-X
      CO=ABS(BET/C)
      TERCO=1.4845*SQRT(CO)
      YT=THICK*(TERCO-CO*(.63+CO*(1.758-CO*(1.4215-CO*.5075))))
      AYC=YC
      IF(XA-BET)420,420,430
420   YC=YA*X*(2.*(C-XA)-X)/(C-XA)**2.
      TZ=(YC-AYC)/DELTX
      COSZ=1./SQRT(1.+TZ**2.)
      SINZ=TZ*COSZ
      GO TO 440
430   YC=YA*(C-X)*(2.*XA-C+X)/XA**2.
      TZ=(YC-AYC)/DELTX
      COSZ=1./SQRT(1.+TZ**2.)
      SINZ=-TZ*COSZ
440   CALL XYUL(X,YC,YT,SINZ,COSZ,XU,YU,XL,YL)
      A(J)=XL
      O(J)=YL
      I=101-J
      A(I)=XU
450   O(I)=YU
      DO 460 J=1,100
      XX(J)=A(J)-C/2.
460   YY(J)=O(J)
      ALF=0.
      N=100.
      NS=N-1.
      WRITE(1,461)
461   FORMAT(2X,"MUST I PRINT THE ABSCISES AND",/,
     *"  ORDENATES OF THE PROFILE AT THE ANGLE",/,
     *"  OF ATTACK AT WHICH IT HAS BEEN DEFINED ?",/)
      READ(1,*) PAO
      IF(PAO.LT.0.5) GO TO 530
470   WRITE(6,480) ALF
480   FORMAT(1H1,//,2X,"ANGLE OF ATTACK AT WHICH",
     *" THE PROFILE IS DEFINED :",X,F6.2,X,
     *"DEGREES.",///)
      WRITE(6,490)
490   FORMAT(4X,"DEFINITION OF THE PROFILE",
     *" AT THIS ANGLE OF ATTACK:",/)
      WRITE(6,500)
500   FORMAT(1H0,4X,"ABSCISES OF THE POINTS",
     *" LIMITING THE SEGMENTS:",/)
      WRITE(6,520) A
```

```
      WRITE(6,510)
510   FORMAT(1H0,4X,"ORDENATES OF THE POINTS",
     *" LIMITING THE SEGMENTS:",/)
      WRITE(6,520) O
520   FORMAT(5(2X,F8.2))
530   WRITE(1,540)
540   FORMAT(2X,"DESIRED ANGLE OF ATTACK ?",
     *" (DEGREES)")
      READ(1,*) ALFA
      DALF=ALFA-ALF
      DALFR=DALF*PI/180.
      DO 550 J=1,N
      X(J)=XX(J)*COS(DALFR)-YY(J)*SIN(DALFR)
550   Y(J)=XX(J)*SIN(DALFR)+YY(J)*COS(DALFR)
      J=1
      X=X(J)
      Y=Y(J)
      CALL DRAW(C,X,Y,NXP,NYP)
      WRITE(12)0,1,NXP,NYP
      DO 560 J=2,N
      X=X(J)
      Y=Y(J)
      CALL DRAW(C,X,Y,NXP,NYP)
560   WRITE(12)1,1,NXP,NYP
      WRITE(12)-1,1,9999,5000
570   XD=X(1)
      DO 590 J=2,N
      IF(X(J)-XD)590,590,580
580   XD=X(J)
      JXD=J
      YXD=Y(J)
590   CONTINUE
      DO 591 J=1,N
      X(J)=X(J)-XD
591   Y(J)=Y(J)-YXD
      WRITE(1,592)
592   FORMAT(2X,"MUST I PRINT THE ABSCISES AND",/,
     *"  ORDENATES OF THE PROFILE, AT THE DESIRED",/,
     *"  ANGLE OF ATTACK, WITH RESPECT TO THE",/,
     *"  ACTUAL AXES ?",/)
      READ(1,*) PXY
      IF(PXY.LT.0.5) GO TO 600
      WRITE(6,593) ALFA
593   FORMAT(1H1,//,2X,"ACTUAL ANGLE OF ATTACK:",
     *X,F6.2,X,"DEGREES.",///)
      WRITE(6,594)
594   FORMAT(4X,"DEFINITION OF THE PROFILE",
     *" AT THIS ANGLE OF ATTACK:",/)
      WRITE(6,595)
595   FORMAT(1H0,4X,"ABSCISES OF THE POINTS",
     *" LIMITING THE SEGMENTS:",/)
      WRITE(6,597) X
      WRITE(6,596)
596   FORMAT(1H0,4X,"ORDENATES OF THE POINTS",
     *" LIMITING THE SEGMENTS:",/)
      WRITE(6,597) Y
597   FORMAT(5(2X,F8.2))
600   XI=X(1)
      DO 602 J=2,N
      IF(X(J)-XI) 601,602,602
```

```
601   XI=X(J)
      JXI=J
      OXI=O(J)
602   CONTINUE
610   WRITE(1,620)
620   FORMAT(2X,"BODY SPEED IN KNOTS ?")
      READ(1,*) UNK
      WRITE(1,630)
630   FORMAT(2X,"AIR DENSITY IN LB(M)/CUBIC FEET",
     *" TIMES 10 TO 5 ?")
      READ(1,*) DEFI5
      WRITE(1,640)
640   FORMAT(2X,"VISCOSITY INDEX IN LB(M)/(FT*SECOND)",
     *" TIMES 10 TO 5 ?")
      READ(1,*) ETAI5
      WRITE(1,650)
650   FORMAT(2X,"LIQUID WATER CONTENT IN",
     *" GRAMMES/CUBIC METER ?")
      READ(1,*) RLWC
      WRITE(1,660)
660   FORMAT(2X,"DROPLET DIAMETER IN MICRONS ?")
      READ(1,*) DIAMG
      WRITE(1,670)
670   FORMAT(2X,"DROPLET DENSITY IN",
     *" GRAMMES/CUBIC CENTIMETER ?")
      READ(1,*) DEG
      WRITE(1,680)
680   FORMAT(2X,"COMPACT ICE DENSITY IN",
     *" GRAMMES/CUBIC CENTIMETER ?")
      READ(1,*) DEHIC
      WRITE(1,690)
690   FORMAT(2X,"DENSITY RATIO ?")
      READ(1,*) RDDE
      WRITE(1,700)
700   FORMAT(2X,"INITIAL ABSCISE OF THE DROPLET WITH",
     */,"  RESPECT TO THE BODY IN CENTIMETERS ?",/,
     *"  RECOMMENDED:",/,
     *"  XGNO=10*C")
      READ(1,*) XGNO
      WRITE(1,710)
710   FORMAT(2X,"FOR AUTOMATIC: INCREMENT IN",
     *" CENTIMETERS",/,"  OF THE INITIAL ORDENATE",
     *" OF THE DROPLET",/,"  IN ORDER TO",
     *" INITIATE A NEW TRAJECTORY ?")
      READ(1,*) DYGNO
      WRITE(1,720)
720   FORMAT(2X,"FOR STOKES: ABS(XGNO/DXGN) ?",
     *" (IQUAL OR GREATER THAN 100.)")
      READ(1,*) Q
      WRITE(1,730)
730   FORMAT(2X,"PER CENT TOLERANCE IN THE EXPLORATION ?")
      READ(1,*) COTA
      WRITE(6,740)
740   FORMAT(1H1,2X,"DATA:",//)
      WRITE(6,750)
750   FORMAT(6X,"C",7X,"NS",7X,"UNK",5X,"DEFI5",
     *4X,"ETAI5",5X,"RLWC",5X,"DIAMG",5X,"DEG",
     *5X,"DEHIC",4X,"RDDE",6X,"XGNO",4X,"DYGNO",
     *6X,"Q",8X,"COTA",/)
      IF(CDATO.LT.0.5) GO TO 770
```

```
      WRITE(6,760)C,NS,UNK,DEFI5,ETAI5,RLWC,DIAMG,
     *DEG,DEHIC,RDDE,XGNO,DYGNO,Q,COTA
 760  FORMAT(4X,F5.2,5X,F4.0,4X,F4.0,5X,F5.0,4X,
     *F5.2,5X,F5.3,5X,F4.1,4X,F4.3,5X,F4.3,5X,
     *F4.3,6X,F4.0,5X,F3.1,5X,F6.0,3X,F7.6,//)
      GO TO 790
 770  WRITE(6,780)NS,UNK,DEFI5,ETAI5,RLWC,DIAMG,
     *DEG,DEHIC,RDDE,XGNO,DYGNO,Q,COTA
 780  FORMAT(14X,F4.0,4X,F4.0,5X,F5.0,4X,
     *F5.2,5X,F5.3,5X,F4.1,4X,F4.3,5X,F4.3,5X,
     *F4.3,6X,F4.0,5X,F3.1,5X,F6.0,3X,F7.6,//)
 790  WRITE(1,800)
 800  FORMAT(2X,"ONLY ONE TRAJECTORY ? (MANUAL MODE)",
     *" ANSWER: YES=1. , NO=0")
      READ(1,*) SUT
      AUTOM=1.-SUT
      CN=0.
      WRITE(1,808)
 808  FORMAT(2X,"FOR AUTOMATIC: MAXIMUM VALUE",/,
     *"  ALLOWED FOR THE INITIAL ORDENATE ?")
      READ(1,*) YGNOX
 809  WRITE(1,810)
 810  FORMAT(2X,"INITIAL ORDENATE",
     *" OF THE DROPLET IN CENTIMETERS ?")
      READ(1,*) YGNO
      IF(YGNO)811,818,812
 811  TOPE=-(C+YXD)
      IF(YGNO.GT.TOPE) GO TO 818
      IF(SUT.GT.0.5) GO TO 815
      GO TO 818
 812  TOPE=C-YXD
      IF(YGNO.GT.TOPE) GO TO 815
      GO TO 818
 815  WRITE(1,816)
 816  FORMAT(2X,"ATENTION: YGNO OUT OF THE",/,
     *"  HORIZONTAL LIMITS OF THE GRAPHIC",/,
     *"  DO YOU WANT PRINTED RESULTS ?",/,
     *"  ANSWER: YES=1. , NO=0.",/)
      READ(1,*) PR
      IF(PR.GT.0.5) GO TO 818
      GO TO 809
 818  WRITE(1,819)
 819  FORMAT(2X,"FAST CALCULATION FOR REYNM LEATER THAN .1 ?",/,
     *"  CAUTION:",/,
     *"  ANSWER 1. IS, IN GENERAL, NOT RECOMMENDED.",/,
     *"  ANSWER: YES=1. , NO=0.")
      READ(1,*) SUD
      WRITE(1,820)
 820  FORMAT(2X,"LENS ?  YES=1. , NO=0.")
      READ(1,*) LENS
      WRITE(1,830)
 830  FORMAT(2X,"FROM STEP NUMBER ?")
      READ(1,*) SLFROM
      WRITE(1,840)
 840  FORMAT(2X,"UP TO STEP NUMBER ?")
      READ(1,*) SLUPTO
      WRITE(1,850)
 850  FORMAT(2X,"TABULATION IN COUPLE ?",
     *" YES=1. , NO=0.")
      READ(1,*) COUPLE
```

```
      WRITE(1,860)
960   FORMAT(2X,"DT FOR THE GENERAL CASE ?",/,
     *"  RECOMMENDED:",/,
     *"  DTGC=(XGNO/20000)/UNK",/)
      READ(1,*) DTGC
      IF(NUMBER.LT.0.5) GO TO 890
      WRITE(6,870)
870   FORMAT(5X,"SUT",5X,"YGNO",6X,"LENS",5X,
     *"SLFROM",6X,"SLUPTO",6X,"COUPLE",7X,"DTGC",
     *6X,"PROFILE",8X,"ALF",7X,"ALFA",6X,"YGNOX",/)
      WRITE(6,880)SUT,YGNO,LENS,SLFROM,SLUPTO,
     *COUPLE,DTGC,NUMBER,ALF,ALFA,YGNOX
880   FORMAT(6X,F2.0,5X,F5.1,6X,F2.0,6X,F5.0,
     *7X,F5.0,9X,F2.0,8X,F6.5,8X,I4,6X,
     *F5.1,6X,F5.1,6X,F5.1,//)
      GO TO 920
890   WRITE(6,900)
900   FORMAT(5X,"SUT",5X,"YGNO",6X,"LENS",5X,
     *"SLFROM",6X,"SLUPTO",6X,"COUPLE",7X,"DTGC",
     *7X,"ALF",8X,"ALFA",6X,"YGNOX",/)
      WRITE(6,910)SUT,YGNO,LENS,SLFROM,SLUPTO,
     *COUPLE,DTGC,ALF,ALFA,YGNOX
910   FORMAT(6X,F2.0,5X,F5.1,6X,F2.0,6X,F5.0,7X,
     *F5.0,9X,F2.0,8X,F6.5,6X,F5.1,6X,F5.1,6X,F5.1,//)
920   WRITE(6,930)
930   FORMAT(2X,"AUXILIAR PARAMETERS CALCULATED BY",
     *" AIP07 PROGRAM:",//)
      UN=51.48*UNK
      VISCI=929.*ETAIS/DEFIS
      ETA5=14.995*ETAIS
      BEP=C
      DXGN=-XGNO/Q
      GLU=-18000.*DXGN*ETA5/(DEG*DIAMG**2.)
      XGNLP=-(4.5*C/7+XD)
      TOPOS=C-YXD
      SW=Q/100.
      COTO=COTA/100.
      RLAMD=DIAMG/(10000.*VISCI)
      COFU8=(DEFIS/158824.)*(DIAMG/10.)**2.
      WRITE(6,940)
940   FORMAT(6X,"UN",7X,"VISCI",5X,"ETA5",6X,
     *"BEP",6X,"GLU",6X,"XGNLP",6X,"SW",8X,
     *"COTO",7X,"RLAMD",6X,"COFU8",8X,"DALF",/)
      WRITE(6,950)UN,VISCI,ETA5,BEP,
     *GLU,XGNLP,SW,COTO,RLAMD,COFU8,DALF
950   FORMAT(4X,F7.2,2X,F7.4,4X,F6.2,3X,
     *F6.2,3X,F7.2,3X,F6.2,4X,F4.0,5X,
     *F8.7,4X,F7.6,4X,F7.6,6X,F5.1,//)
      WRITE(1,960)
960   FORMAT(2X,"NSSF ? (0/1.)")
      READ(1,*) CNSS
969   WRITE(1,970)
970   FORMAT(2X,"TABULATION ? : YES=1. , NO=0.")
      READ(1,*) TAB
      ARTAB=TAB
980   WRITE(1,990)
990   FORMAT(2X,"TRAJECTORY IN PLOTTER ?",
     *" ANSWER: YES=1. , NO=0.")
      READ(1,*) PLOT
      WRITE(1,1000)
```

```
1000  FORMAT(2X,"DO YOU WANT A,O IN",
     *" PUNCHED TAPE ? : YES=1. , NO=0.")
      READ(1,*) PUNCH
      IF(PUNCH.LT.0.5) GO TO 1020
      WRITE(4,1010)(A(I),I=1,100),(O(K),K=1,100)
1010  FORMAT(2X,F10.3)
1020  CONTINUE
1030  YGNO=YGNO-DYGNO
1040  S=0.
      AYGNO=YGNO
      YGNO=YGNO+DYGNO
      IF(YGNO-TOPOS)1050,1049,1049
1049  IF(YGN-TOPOS)1050,2290,2290
1050  IF(YGNO-YGNOX)1052,1052,1051
1051  IF(AUTOM.GT.0.5) GO TO 2310
1052  W=0.
      DT=DTGC
      T=0.
      XN=0.
      DXG=0.
      XG=XGNO
      DYG=0.
      YG=YGNO
      DXGN=-XGNO/Q
      XGN=XGNO
      DYGN=0.
      YGN=YG
      CALL SIG(NS,XGN,YGN,CNSS,SIG1,SIG2,SIG3,SIG4)
      VX=(SIG1-SIG3)*UN/PI
      VY=(SIG2-SIG4)*UN/PI
      UXF=VX
      UYF=VY
      DUXG=0.
      UXG=UXF
      DUYG=0.
      UYG=UYF
      ARX=0.
      ARY=0.
      AREYN=0.
      RX=0.
      RY=0.
      REYN=0.
      REYNM=0.
      SF=0.
      FT=0.
      TSUP=3.
      ACORTE=CORTE
      AXCP=XCP
      AYCP=YCP
      ABXCP=BXCP
      ABYCP=BYCP
      CORTE=0.
1060  WRITE(6,1070) YGNO,CNSS
1070  FORMAT(//,4X,"YGNO=",X,F4.1,6X,"NSSF=",X,F5.3,//)
      WRITE(6,1080)
1080  FORMAT(6X,"S",8X,"T",7X,"XN",7X,"XG",6X,
     *"XGN",6X,"YGN",6X,"UXF",6X,"UYF",6X,"UXG",6X,
     *"UYG",6X,"DXG",6X,"DXGN",6X,"DYG",6X,"REYNM",/)
1090  IF(TAB.LT.0.5) GO TO 1110
      WRITE(6,1100) S,T,XN,XG,XGN,YGN,UXF,UYF,
```

```
      *UXG,UYG,DXG,DXGN,DYG,REYNM
1100   FORMAT(2X,F6.0,4X,F7.5,2X,F6.1,2X,F7.5,2X,
      *F6.1,3X,F7.4,X,F8.2,X,F8.2,X,F8.2,X,
      *F8.2,2X,F7.5,2X,F7.2,2X,F8.5,2X,F9.3)
1110   S=S+1.
       DRX=RX-ARX
       DRY=RY-ARY
       DREYN=REYN-AREYN
       ADT=DT
       AT=T
       AXN=XN
       AXG=XG
       ADYG=DYG
       AYG=YG
       AXGN=XGN
       AYGN=AYG
       AUXF=UXF
       AUYF=UYF
       ADUXG=DUXG
       AUXG=UXG
       ADUYG=DUYG
       AUYG=UYG
       ARX=RX
       ARY=RY
       AREYN=REYN
       W=W+1.
       IF(SW+.2-W) 1120,1130,1130
1120   W=1.
       IF(S.LT.1.5) GO TO 1630
       IF(DRX.LT.0.0.OR.DRX.EQ.0.0) GO TO 1630
       IF(DRY.LT.0.0.OR.DRY.EQ.0.0) GO TO 1630
       IF(DREYN.LT.0.0.OR.DREYN.EQ.0.0) GO TO 1630
1130   IF(AREYN-.1) 1139,1139,1630
1139   IF(SUD.LT.0.5) GO TO 1630
1140   DXGN=-XGN0/Q
       XGN=AXGN+DXGN
       IF(XGN-XGNLP) 1180,1190,1150
1150   SZC=0.
       IF(XGN) 1160,1160,1290
1160   IF(XI-XGN) 1170,1170,1290
1170   SZC=1.
       GO TO 1290
1180   XGN=XGNLP
1190   IF(SF.LT.0.5) GO TO 1260
1200   WRITE(6,1210)
1210   FORMAT(/,7X,"XGNLP REACHED",//)
       WRITE(12)-1,1,9999,5000
       FT=1.
       CORTE=0.
       IF(AUTOM.GT.0.5) GO TO 2250
       IF(DPT.GT.0.5) GO TO 1240
       DPT=1.
       GO TO 1240
1211   WRITE(1,1212)
1212   FORMAT(2X,"NSSF ?",/)
       READ(1,*) CNSS
1220   WRITE(1,1230)
1230   FORMAT(2X,"YGN0 ?",/)
       READ(1,*) YGN0
       IF(YGN0)1231,1233,1232
```

```
1231  TOPE=-(C+YXD)
      IF(YGNO.GT.TOPE) GO TO 1233
      IF(SUT.GT.0.5) GO TO 2299
      GO TO 1233
1232  TOPE=C-YXD
      IF(YGNO.GT.TOPE) GO TO 2299
1233  WRITE(1,1235)
1235  FORMAT(2X,"REMEMBER: YOU CAN DETERMINE",/,
     *"  A TANGENCY POINT BY LOOKING EXCLUSIVELY",/,
     *"  AT THE VALUES GIVEN BY THE PRINTER FOR",/,
     *"  THE COLLISION POINTS CORRESPONDING TO",/,
     *"  DIFFERENT VALUES OF SOME YGNO ADEQUATELY",/,
     *"  SELECTED IN MANUAL MODE.  THEN :",/,
     *"  IS THIS TRAJECTORY EXCLUSIVELY TO",/,
     *"  DETERMINE A TANGENCY POINT ?",/,
     *"  ANSWER: YES=1. , NO=0.",/,
     *"  (NO MANDATORY, ONLY RECOMMENDED)",/)
      READ(1,*) TTDTP
      IF(TTDTP.LT.0.5) GO TO 969
      PLOT=0.
      TAB=0.
      PUNCH=0.
      GO TO 1030
1240  WRITE(1,1250)
1250  FORMAT(2X,"ANOTHER TRAJECTORY WITH NEW NSSF",/,
     *"  AND/OR NEW YGNO ? ANSWER: YES=1. , NO=0.",/)
      READ(1,*) ATWNY
      IF(ATWNY.GT.0.5) GO TO 1211
      GO TO 1270
1260  SF=1.
      GO TO 1290
1270  WRITE(1,1280)
1280  FORMAT(2X,"ANOTHER TRAJECTORY WITH NEW DATA ?",
     *" YES=1.  NO=0.",/)
      READ(1,*)ATWND
      IF(.5.LT.ATWND) GO TO 530
      GO TO 2320
1290  DYG=ADYG+ADUYG*ADT
      CALL SUDYG(DYG,XGN,AYGN,NS,UN,DXGN,AUXG,AUYG,
     *AUXF,AUYF,GLU,CNSS,COTA,CDYG,DUXG,FACX,DUYG,UXF,UYF)
      DYG=CDYG
      DYGN=DYG
      DXG=FACX*(2.*AUXG+DUYG)
      XG=AXG+DXG
      YG=AYG+DYG
      YGN=YG
      DXN=DXG-DXGN
      XN=AXN+DXN
      DT=DXN/UN
      T=AT+DT
      UXG=AUXG+DUXG
      UYG=AUYG+DUYG
      U=((UXF-UXG)**2.+(UYF-UYG)**2.)**.5
      REYN=U*DIAMG/(10000.*VISCI)
      REYNM=(REYN+AREYN)/2.
1300  IF(.5-S2C) 1310,1310,1301
1301  IF(SF-.5)1820,1820,1811
1310  IF(TSUP.LT.0.5) GO TO 1390
      IF(TSUP.GT.2.) GO TO 1370
1320  J=J2+1
```

```
1330  XUEP=X(J)
      IF(XGN-XUEP) 1340,1350,1360
1340  J=J+1
      DNJ=N-J
      IF(DNJ.GT.0.5) GO TO 1330
      J=1
      GO TO 1330
1350  YUEP=Y(J)
      IF(YGN-YUEP) 1520,1460,1470
1360  XUJ1=XUEP
      J1=J
      YUJ1=Y(J)
      J=J-1
      XUJ2=X(J)
      YUJ2=Y(J)
      J2=J
      GO TO 1480
1370  IF(YGN) 1380,1440,1450
1380  TSUP=0.
      J2=JXD
1390  J=J2-1
1400  XLEP=X(J)
      IF(XGN-XLEP) 1410,1420,1430
1410  J=J-1
      IF(J.GT.0.5) GO TO 1400
      J=N
      GO TO 1400
1420  YLEP=Y(J)
      IF(YGN-YLEP) 1470,1460,1540
1430  XLJ1=XLEP
      J1=J
      YLJ1=Y(J)
      J=J+1
      XLJ2=X(J)
      YLJ2=Y(J)
      J2=J
      GO TO 1500
1440  XGN=0.
      GO TO 1460
1450  TSUP=1.
      J2=JXD
      GO TO 1320
1460  GO TO 1560
1470  GO TO 1820
1480  IF(XUJ2.EQ.XUJ1) GO TO 1820
      TERM5=(YUJ2-YUJ1)/(XUJ2-XUJ1)
      EXGN=TERM5*(XGN-XUJ1)+YUJ1
      IF(YGN-EXGN) 1490,1460,1820
1490  CALL CORTA(XUJ1,YUJ1,XUJ2,YUJ2,AXGN,AYGN,
     *XGN,YGN,XCP,YCP)
      GO TO 1570
1500  IF(XLJ2.EQ.XLJ1) GO TO 1820
      TERM5=(YLJ2-YLJ1)/(XLJ2-XLJ1)
      EXGN=TERM5*(XGN-XLJ1)+YLJ1
      IF(YGN-EXGN) 1820,1460,1510
1510  CALL CORTA(XLJ1,YLJ1,XLJ2,YLJ2,AXGN,AYGN,
     *XGN,YGN,XCP,YCP)
      GO TO 1570
1520  JM1=J-1
      IF(JM1.GT.0.5) GO TO 1530
```

```
      J=N
1530  J=J-1
      XUEP2=X(J)
      YUEP2=Y(J)
      CALL CORTA(XUEP,YUEP,XUEP2,YUEP2,AXGN,AYGN,
     *XGN,YGN,XCP,YCP)
      GO TO 1570
1540  DNJ=N-J
      IF(DNJ.GT.0.5) GO TO 1550
      J=1
1550  J=J+1
      XLEP2=X(J)
      YLEP2=Y(J)
      CALL CORTA(XLEP,YLEP,XLEP2,YLEP2,AXGN,AYGN,
     *XGN,YGN,XCP,YCP)
      GO TO 1570
1560  XCP=XGN
      YCP=YGN
      BXCP=AXGN
      BYCP=AYGN
1570  XGN=XCP
      YGN=YCP
      IF(AUTOM-.5) 1580,1580,1980
1580  IF(PLOT.LT.0.5) GO TO 1610
      CALL DRAW2(C,XD,YXD,XGN,YGN,NXP,NYP)
1590  WRITE(12)1,1,NXP,NYP
1600  WRITE(12)-1,1,9999,5000
1610  WRITE(6,1620)
1620  FORMAT(/,6X,"THE DROPLET HITS THE SURFACE.",/)
      TAB=0.
      FT=1.
      CORTE=1.
      GO TO 2060
1630  DT=DTGC
      UX=AUXF-AUXG-(ADUXG/2.)*DTGC/ADT
      UY=AUYF-AUYG-(ADUYG/2.)*DTGC/ADT
      U=SQRT(UX**2.+UY**2.)
      REYN=RLAMD*U
      REYNM=(REYN+AREYN)/2.
      RX=RLAMD*ABS(UX)
      RY=RLAMD*ABS(UY)
      IF(RX)1658,1658,1637
1637  IF(.1-RX)1639,1639,1638
1638  CDX=24./RX
      GO TO 1660
1639  IF(1.-RX)1650,1650,1640
1640  CDX=24./RX+4.5
      GO TO 1660
1650  CDX=10.**((3.92494-ALOG10(RX))**2./8.322698-.4038228)
1658  IF(RY)1690,1690,1660
1660  IF(.1-RY)1662,1662,1661
1661  CDY=24./RY
      GO TO 1690
1662  IF(1.-RY)1680,1680,1670
1670  CDY=24./RY+4.5
      GO TO 1690
1680  CDY=10.**((3.92494-ALOG10(RY))**2./8.322698-.4038228)
1690  IF(UX)1700,1705,1710
1700  FUERX8=-COFU8*CDX*UX**2.
      GO TO 1720
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 1705  FUERX8=0.
       GO TO 1720
 1710  FUERX8=COFU8*CDX*UX**2.
 1720  IF(UY)1730,1735,1740
 1730  FUERY8=-COFU8*CDY*UY**2.
       GO TO 1750
 1735  FUERY8=0.
       GO TO 1750
 1740  FUERY8=COFU8*CDY*UY**2.
 1750  ACELX=19.1*FUERX8/(DEG*(DIAMG/10.)**3.)
       ACELY=19.1*FUERY8/(DEG*(DIAMG/10.)**3.)
       DUXG=ACELX*DT
       DUYG=ACELY*DT
       DXG=(AUXG+DUXG/2.)*DT
       DYG=(AUYG+DUYG/2.)*DT
       DXN=UN*DT
       DXGN=DXG-DXN
       DYGN=DYG
       XGN=AXGN+DXGN
       YGN=AYGN+DYGN
       CALL SIG(NS,XGN,YGN,CNSS,SIG1,SIG2,SIG3,SIG4)
       VX=(SIG1-SIG3)*UN/PI
       VY=(SIG2-SIG4)*UN/PI
       UXF=VX
       UYF=VY
       XG=AXG+DXG
       YG=AYG+DYG
       XN=AXN+DXN
       T=AT+DT
       UXG=AUXG+DUXG
       UYG=AUYG+DUYG
 1760  IF(XGN-XGNLP)1790,1800,1770
 1770  IF(XGN)1780,1780,1820
 1780  IF(XI-XGN)1970,1970,1820
 1790  XGN=XGNLP
 1800  IF(SF.LT.0.5) GO TO 1810
       GO TO 1200
 1810  SF=1.
 1811  XC=XGNLP
       YC=YGN+(XGNLP-XGN)*DYGN/DXGN
       XGN=XC
       YGN=YC
 1820  IF(PLOT.LT.0.5) GO TO 2040
       CALL DRAW2(C,XD,YXD,XGN,YGN,NXP,NYP)
       CALL DRAW2(C,XD,YXD,AXGN,AYGN,NXPA,NYPA)
       IF(NXP.LT.9999.OR.NXP.EQ.9999) GO TO 1830
       WRITE(12)-1,1,9999,NYP
       GO TO 2040
 1830  IF(NYP-8500)1840,1850,1860
 1840  IF(NYPA-8500)1870,1940,1910
 1850  IF(NYPA-8500)1940,1950,1950
 1860  IF(NYPA-8500)1910,1950,1950
 1870  IF(NYP-1500)1880,1890,1900
 1880  IF(NYPA-1500)1960,1960,1920
 1890  IF(NYPA-1500)1960,1960,1940
 1900  IF(NYPA-1500)1920,1940,1940
 1910  COEFY=(NYPA-8500)/(8500-NYP)
       NYP=8500
       GO TO 1930
 1920  COEFY=(NYPA-1500)/(1500-NYP)
```

```
      NYP=1500
1930  NXP=(COEFY*NXP+NXPA)/(COEFY+1.)
1940  WRITE(12)1,1,NXP,NYP
      GO TO 2040
1950  WRITE(12)-1,1,NXP,8500
      GO TO 2040
1960  WRITE(12)-1,1,NXP,1500
      GO TO 2040
1970  GO TO 1310
1980  CN=CN+1.
      IF(1.5-CN)1990,1990,1580
1990  BASE=((AXCP-XCP)**2.+(YCP-AYCP)**2.)**.5
C     WMDR=6*RLWC*DYGNO*(UN/1000.)/(BASE*100.)
      IF(YCP.GT.0.0) GO TO  2020
2000  GO TO 1580
2020  GO TO 1580
2040  IF(2.2-W)1110,1110,2050
2050  IF(COUPLE+1.2-W)1110,1110,2060
2060  IF(TAB.LT.0.5) GO TO 2100
      WRITE(6,2070)S,T,XN,XG,XGN,YGN,UXF,UYF,
     *UXG,UYG,DXG,DXGN,DYG,REYNM
2070  FORMAT(2X,F6.0,4X,F7.5,2X,F6.1,2X,F7.5,2X,
     *F6.1,3X,F7.4,X,F8.2,X,F8.2,X,F8.2,X,
     *F8.2,2X,F7.5,2X,F7.2,2X,F8.5,2X,F9.3)
      IF(.5-LENS)2080,2080,2100
2080  IF(S-SLFROM)2100,2090,2090
2090  IF(SLUPTO-S)2100,2110,2110
2100  TAB=ARTAB
      IF(FT.LT.0.5) GO TO 1110
      IF(AUTOM.GT.0.5) GO TO 2250
      GO TO 1240
2110  WRITE(6,2120) T
2120  FORMAT(/,9X,"T=",2X,F15.6)
      WRITE(6,2130) XN
2130  FORMAT(9X,"XN=",2X,F15.6)
      WRITE(6,2140) XG
2140  FORMAT(9X,"XG=",2X,F15.6)
      WRITE(6,2150) XGN
2150  FORMAT(9X,"XGN=",2X,F15.6)
      WRITE(6,2160) YGN
2160  FORMAT(9X,"YGN=",2X,F15.6)
      WRITE(6,2170) UXF
2170  FORMAT(9X,"UXF=",2X,F15.6)
      WRITE(6,2180) UYF
2180  FORMAT(9X,"UYF=",2X,F15.6)
      WRITE(6,2190) UXG
2190  FORMAT(9X,"UXG=",2X,F15.6)
      WRITE(6,2200) UYG
2200  FORMAT(9X,"UYG=",2X,F15.6)
      WRITE(6,2210) DXG
2210  FORMAT(9X,"DXG=",2X,F15.6)
      WRITE(6,2220) DXGN
2220  FORMAT(9X,"DXGN=",2X,F15.6)
      WRITE(6,2230) DYG
2230  FORMAT(9X,"DYG=",2X,F15.6)
      WRITE(6,2240) REYNM
2240  FORMAT(9X,"REYNM=",2X,F15.6,//)
      GO TO 2100
2250  DIFCOR=CORTE-ACORTE
      ABDICO=ABS(DIFCOR)
```

```
      IF(.5-ABDICO)2260,2260,1040
2260  IF(DIFCOR)2270,2270,2280
2270  YGN03=AYGNO
      YGN04=YGNO
      WRITE(6,2271) YGN03,YGN04
2271  FORMAT(/,6X,"YGN03=",2X,F7.4,2X,"YGN04=",2X,F7.4,/)
      GO TO 1040
2280  YGN01=AYGNO
      YGN02=YGNO
      WRITE(6,2281) YGN01,YGN02
2281  FORMAT(/,6X,"YGN01=",2X,F7.4,2X,"YGN02=",2X,F7.4,/)
      GO TO 1040
2290  IF(AUTOM.GT.0.5) GO TO 2310
      GO TO 1052
2299  WRITE(1,2300)
2300  FORMAT(2X,"ATENTION:  YGNO OUT OF THE",/,
     *"  HORIZONTAL LIMITS OF THE GRAPHIC",/,
     *"  DO YOU WANT PRINTED RESULTS ?",/,
     *"  ANSWER: YES=1. , NO=0.",/)
      READ(1,*) PR
      IF(PR.GT.0.5) GO TO 1030
      GO TO 1240
2310  PP=0.
C     FUTURE EXPANSION BY HERE.
2320  WRITE(12)-1,0,9999,5000
      STOP
      END
      BLOCKDATA
      COMMON/COM2/X(100),Y(100)
      END
      SUBROUTINE SUDYG(S,P01,P02,P03,P04,P05,P06,P07,
     *P08,P09,P10,P11,COT,R,SA01,SA02,SA03,SA04,SA05)
      COMMON/COM2/X(100),Y(100)
      IF(S)2,1,1
1     IF(.000001-S)5,5,3
2     IF(.000001+S)5,5,4
3     S=.000001
      GO TO 5
4     S=-.000001
5     E=S
6     DO 10 I=1,2
      SSP02=E+P02
      CALL SIG(P03,P01,SSP02,P11,SIG1,SIG2,SIG3,SIG4)
      VX=(SIG1-SIG3)*P04/3.141592
      VY=(SIG2-SIG4)*P04/3.141592
      SA04=VX
      SA05=VY
      BN=P10+2.*(P04-P06)
      CF=P10*(P08-2.*P06+VX)
      BNP=ABS(BN**2.-4.*CF)
      SA01=(BN-BNP**.5)/2.
      SA02=-P05/(2.*P04-2.*P06-SA01)
      SA03=(P09-2.*P07+VY)*SA01/(P08-2.*P06+VX)
      C=SA02*(2.*P07+SA03)
      ERREL=100.*ABS(C/E-1.)
      IF(ERREL-COT)19,7,7
7     GO TO (8,9),I
8     C1=C
      E=C
      GO TO 10
```

```
 9    C2=C
 10   CONTINUE
      DC1S=C1-S
      DC2S=C2-S
      DC21=C2-C1
      DABS=ABS(DC21)-ABS(DC1S)
      IF(DC1S)11,11,14
 11   IF(DC21)12,12,13
 12   IF(DABS)18,18,17
 13   IF(DC2S)18,18,17
 14   IF(DC21)15,15,16
 15   IF(DC2S)17,17,18
 16   IF(DABS)18,18,17
 17   E=S-DC1S**2./DC21
      GO TO 6
 18   E=C2+DC21**2./DC1S
      GO TO 6
 19   R=E
      RETURN
      END
      SUBROUTINE SIG(NT,EF13,EF14,CNSSF,
     *SIG1F,SIG2F,SIG3F,SIG4F)
      COMMON/COM2/X(100),Y(100)
      SIG1F=0.
      SIG2F=0.
      SIG3F=0.
      SIG4F=0.
      SC=CNSSF
      DO 9 J=1,NT
      J1=J
      J2=J+1
      XJ1=X(J1)
      YJ1=Y(J1)
      XJ2=X(J2)
      YJ2=Y(J2)
      PVECT=(XJ2-XJ1)*(EF14-YJ1)-(YJ2-YJ1)*(EF13-XJ1)
      IF(PVECT)1,1,2
 1    SC=1.
 2    CALL STER(EF13,EF14,XJ1,YJ1,XJ2,YJ2,TERX,TERY)
      IF(XJ2-XJ1)3,7,4
 3    IF((YJ2-YJ1)/(XJ2-XJ1))5,8,6
 4    IF((YJ2-YJ1)/(XJ2-XJ1))6,8,5
 5    SIG1F=SIG1F+TERX*SC
      SIG2F=SIG2F+TERY*SC
      GO TO 8
 6    SIG3F=SIG3F+TERX*SC
      SIG4F=SIG4F+TERY*SC
      GO TO 8
 7    CONTINUE
      IF(YJ2-YJ1)6,8,5
 8    SC=CNSSF
 9    CONTINUE
      RETURN
      END
      SUBROUTINE STER(EFX,EFY,EFX1,EFY1,EFX2,EFY2,SFX,SFY)
      XJ=(EFX1+EFX2)/2.
      YJ=(EFY1+EFY2)/2.
      PARX=EFX-XJ
      PARY=EFY-YJ
      PARX2=PARX**2.
```

```
      PARY2=PARY**2.
      DENO=PARX2+PARY2
      YMOD=ABS(EFY2-EFY1)
      SFX=PARX*YMOD/DENO
      SFY=PARY*YMOD/DENO
      RETURN
      END
      SUBROUTINE CORTA(X1,Y1,X2,Y2,X3,Y3,X4,Y4,XC,YC)
      IF(X1.EQ.X2) GO TO 1
      IF(X3.EQ.X4) GO TO 2
      TERM1=(Y1-Y2)/(X1-X2)
      TERM2=(Y4-Y3)/(X4-X3)
      TERM3=TERM1*X2-TERM2*X3
      TERM4=TERM1-TERM2
      XC=(TERM3+Y3-Y2)/TERM4
      YC=TERM1*(XC-X2)+Y2
      GO TO 3
1     XC=X1
      YC=(Y4-Y3)*(XC-X3)/(X4-X3)+Y3
      GO TO 3
2     XC=X4
      YC=(XC-X1)*(Y2-Y1)/(X2-X1)+Y1
3     CONTINUE
      RETURN
      END
      SUBROUTINE DRAW(REF,XF,YF,NXPF,NYPF)
      NXPF=500.*(4.5+7.*XF/REF)
      NYPF=500.*(10.+7.*YF/REF)
      RETURN
      END
      SUBROUTINE DRAW2(REF,XDF,YXDF,XF,YF,NXPF,NYPF)
      NXPF=500.*(4.5+7.*(XDF+XF)/REF)
      NYPF=500.*(10.+7.*(YXDF+YF)/REF)
      RETURN
      END
      SUBROUTINE XYUL(XF,YCF,YTF,SINNU,
     *COSNU,XUF,YUF,XLF,YLF)
      YUF=YCF+YTF*COSNU
      XUF=XF-YTF*SINNU
      YLF=YCF-YTF*COSNU
      XLF=XF+YTF*SINNU
      RETURN
      END
$
```

SETS OF TRAJECTORIES

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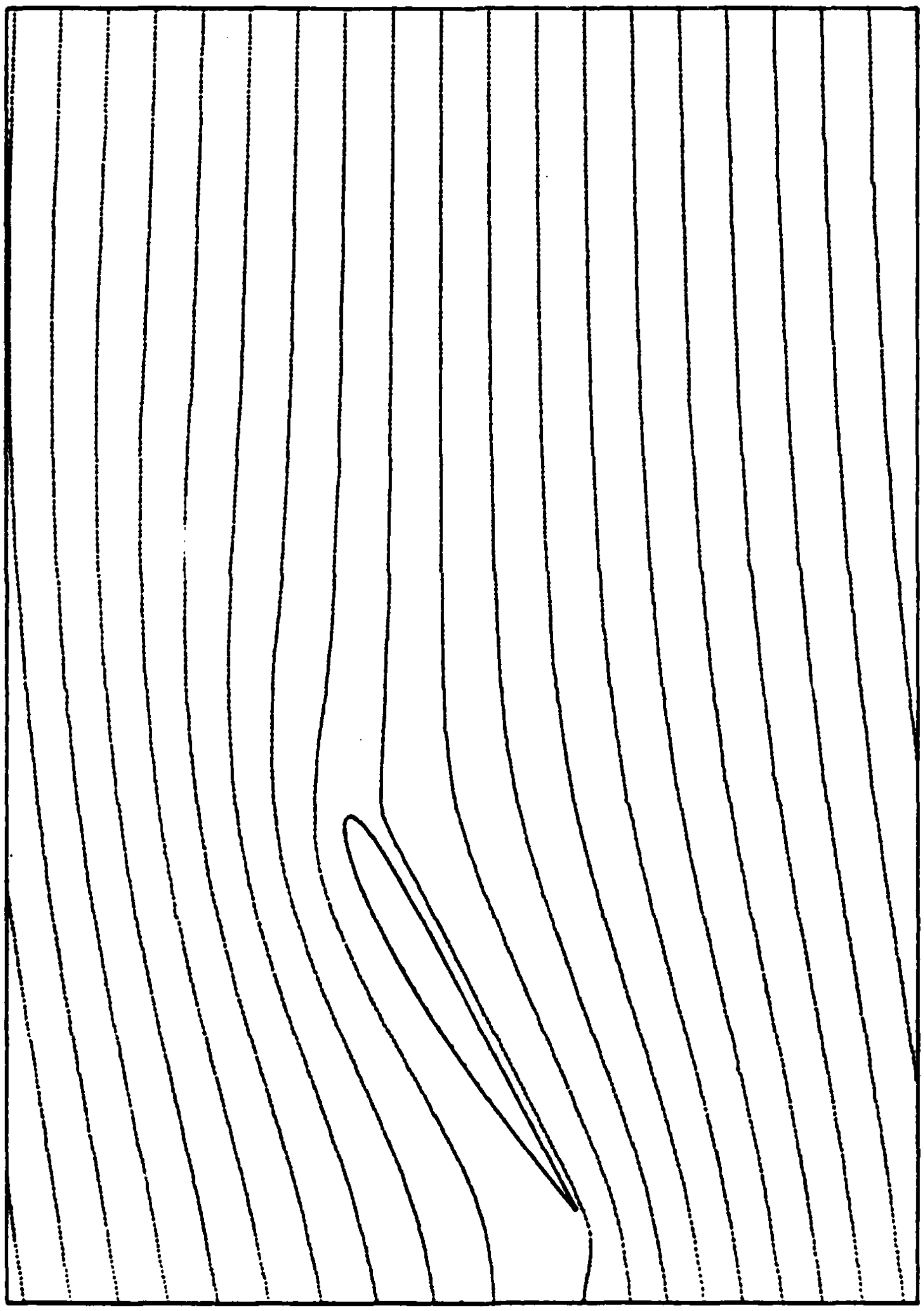


A-1/002.3 Imprenta del INTA

ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.08
75.14	77.68	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.58
99.48	99.39	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.88	-.81
-.73	-.64	-.53	-.38	-.01
.01	.40	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.70	.92	.09

A-1/002.3 Imprenta del INTA

ACTUAL ANGLE OF ATTACK: 30.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISSES OF THE POINTS LIMITING THE SEGMENTS:

-86.81	-82.26	-77.81	-73.37	-68.93
-64.50	-60.07	-55.65	-51.23	-46.81
-42.40	-38.00	-33.61	-29.20	-24.75
-20.32	-18.10	-15.91	-13.72	-11.53
-9.41	-8.34	-7.28	-6.24	-5.21
-4.19	-3.69	-3.20	-2.71	-2.23
-1.77	-1.54	-1.31	-1.09	-.88
-.67	-.57	-.48	-.39	-.30
-.21	-.17	-.13	-.09	-.06
-.03	-.01	0.00	-.01	-.16
-.16	-.47	-.64	-.79	-.93
-1.06	-1.18	-1.30	-1.42	-1.54
-1.74	-1.94	-2.13	-2.32	-2.51
-2.87	-3.23	-3.58	-3.93	-4.27
-4.96	-5.60	-6.25	-6.89	-7.53
-8.78	-10.01	-11.23	-12.43	-13.62
-15.97	-18.28	-20.55	-22.80	-25.02
-29.40	-33.71	-37.99	-42.25	-46.47
-50.65	-54.80	-58.91	-62.99	-67.04
-71.06	-75.05	-79.00	-82.93	-86.81

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-49.40	-47.21	-44.86	-42.52	-40.18
-37.84	-35.51	-33.19	-30.86	-28.54
-26.21	-23.87	-21.52	-19.13	-16.72
-14.28	-13.05	-11.81	-10.55	-9.28
-7.97	-7.31	-6.63	-5.94	-5.24
-4.52	-4.14	-3.76	-3.37	-2.97
-2.56	-2.34	-2.12	-1.90	-1.66
-1.42	-1.29	-1.16	-1.02	-.88
-.73	-.64	-.55	-.46	-.36
-.25	-.13	0.00	.16	.51
.52	.80	.89	.95	1.00
1.03	1.06	1.08	1.10	1.12
1.14	1.15	1.15	1.15	1.15
1.14	1.11	1.08	1.03	.99
.87	.75	.61	.46	.30
-.05	-.42	-.82	-1.24	-1.67
-2.58	-3.55	-4.56	-5.62	-6.71
-9.00	-11.43	-13.99	-16.66	-19.39
-22.18	-25.02	-27.92	-30.86	-33.84
-36.67	-39.94	-43.05	-46.20	-49.40

```
DATA:

   C      NS     UNK    DEFIS   ETAIS   RLUC   DIANG   DEG   DEHIC   RODE   XGN0   DYGN0    Q     COTA
 100.0    99.    10.    7650.    1.20   .635    40.0  1.00   .917   .750   500.    10.   100.  .010000

  SUI    YGN0   LENS   BLFRON   BLUPTO   COUPLE    DTGC   PROFILE   ALF   ALFA   YGNOX
   0.   -120.    0.      0.       0.       0.     .00250    2409    0.0   30.0   120.0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

   UN     VISCI   ETAS    DEP     GLU     XGNLP   SW     COTO      RLAND    COFUR    DALF
 514.80   .1457  17.07  100.00  1005.41  -107.7   1.  .0001000  .027449  .770664   30.0

YGN0= -120     NSSF= 0.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNR

    XGNLP REACHED

YGN0= -110     NSSF= 0.000

   S    T    XN    XG    XGN    YGN    UXF    -UYF   UXG    UYG    DXG    DXGN    DYG    REYNR

    XGNLP REACHED

YGN0= -100     NSSF= 0.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNR

    XGNLP REACHED

YGN0= -90.     NSSF= 0.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNR
```

A-4/002.3 Imprenta del INTA

```
XGNLP REACHED

YGN0= -80.     NSSF= 0.000

   S     T     XN    XG    XGN   YGN   UXF   UYF   UXG   UYG   DXG   DXGN  DYG   REYNR
XGNLP REACHED

YGN0= -70.     NSSF= 0.000

   S     T     XN    XG    XGN   YGN   UXF   UYF   UXG   UYG   DXG   DXGN  DYG   REYNR
XGNLP REACHED

YGN0= -60.     NSSF= 0.000

   S     T     XN    XG    XGN   YGN   UXF   UYF   UXG   UYG   DXG   DXGN  DYG   REYNR
XGNLP REACHED

YGN0= -50.     NSSF= 0.000

   S     T     XN    XG    XGN   YGN   UXF   UYF   UXG   UYG   DXG   DXGN  DYG   REYNR
XGNLP REACHED

YGN0= -40.     NSSF= 0.000

   S     T     XN    XG    XGN   YGN   UXF   UYF   UXG   UYG   DXG   DXGN  DYG   REYNR
XGNLP REACHED
```

A-4/002.3 Imprenta del INTA

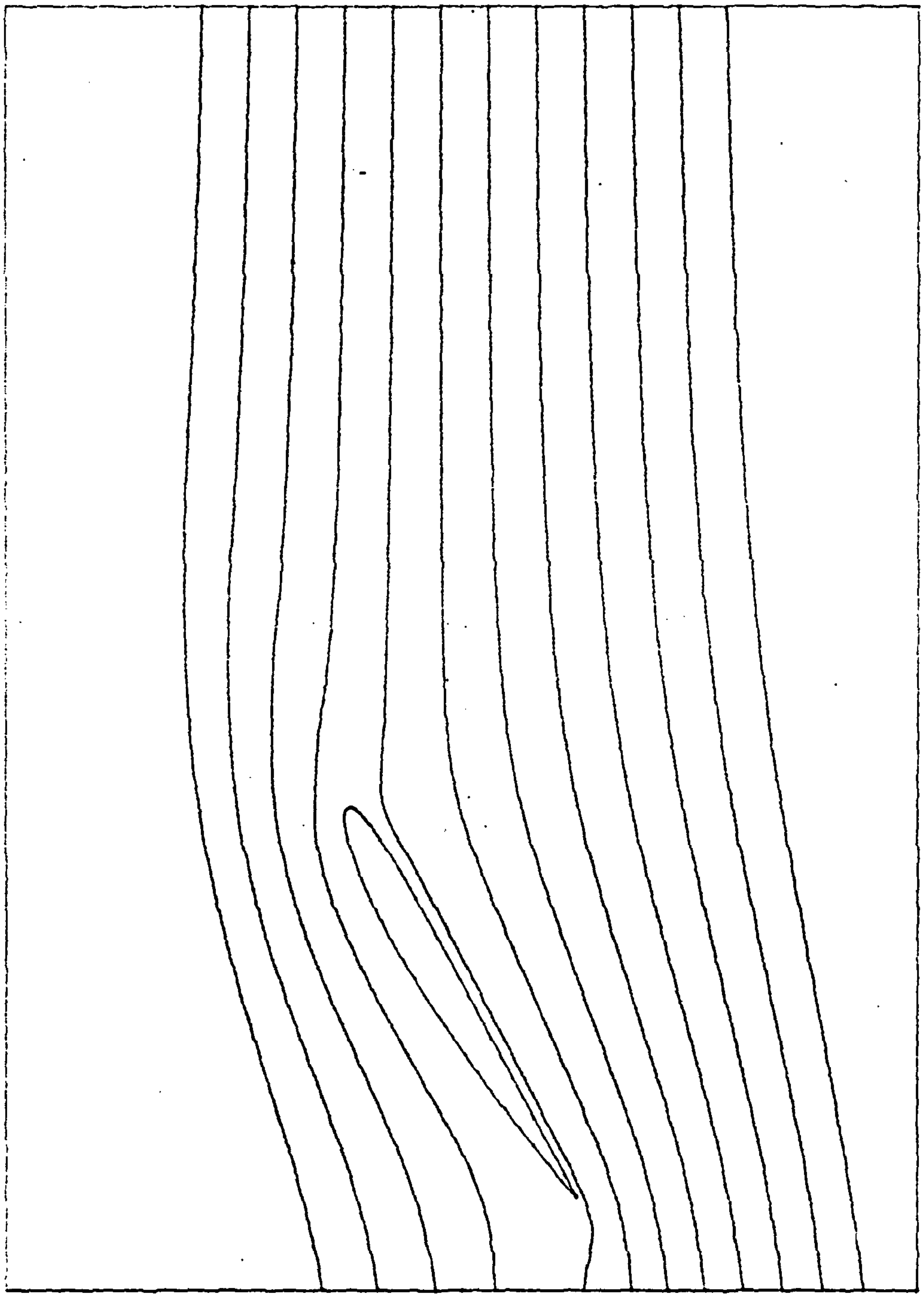
```
YGHO= -30.     NBSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

  XGHLP REACHED

YGHO= -20.     NBSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

  XGHLP REACHED

YGHO= -10.     NBSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

  XGHLP REACHED

YGHO=  0.0     NBSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

  XGHLP REACHED

YGHO= 10.0     NBSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

  XGHLP REACHED

YGHO= 20.0     NBSF= 0.000
```

A-4/002.3 Imprenta del INTA

```
    S       T      XN      XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG    DXGN     DYG   REYNR
     XGHLP REACHED

   YGNO= 30.0     NSSF= 0.000
    S       T      XN      XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG    DXGN     DYG   REYNR
     XGHLP REACHED

   YGNO= 40.0     NSSF= 0.000
    S       T      XN      XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG    DXGN     DYG   REYNR
     XGHLP REACHED

   YGNO= 50.0     NSSF= 0.000
    S       T      XN      XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG    DXGN     DYG   REYNR
     XGHLP REACHED

   YGNO= 60.0     NSSF= 0.000
    S       T      XN      XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG    DXGN     DYG   REYNR
     XGHLP REACHED

   YGNO= 70.0     NSSF= 0.000
    S       T      XN      XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG    DXGN     DYG   REYNR
     XGHLP REACHED
```

```
YGNO= 80.0      NSSF= 0.000
   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
    XGNLP REACHED

YGNO= 90.0      NSSF= 0.000
   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
    XGNLP REACHED

YGNO= 100.      NSSF= 0.000
   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
    XGNLP REACHED
```

A-4/002.3 Imprenta del INTA



ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.03
75.16	77.60	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.58
99.48	99.39	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.23
84.76	82.28	79.60	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.86	-2.89	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.36	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.89	-.61
-.73	-.64	-.53	-.38	-.31
.41	.40	.56	.69	.80
.99	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.32	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.70	.92	.09

ACTUAL ANGLE OF ATTACK: 30.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-86.01	-82.26	-77.81	-73.37	-68.93
-64.50	-60.07	-55.65	-51.23	-46.81
-42.40	-38.00	-33.61	-29.20	-24.75
-20.32	-18.10	-15.91	-13.72	-11.55
-9.41	-8.34	-7.28	-6.24	-5.21
-4.19	-3.69	-3.20	-2.71	-2.23
-1.77	-1.54	-1.31	-1.09	-.88
-.67	-.57	-.48	-.39	-.30
-.21	-.17	-.13	-.09	-.06
-.03	-.01	0.00	-.01	-.16
-.16	-.47	-.64	-.79	-.93
-1.06	-1.18	-1.30	-1.42	-1.54
-1.74	-1.94	-2.13	-2.32	-2.51
-2.87	-3.23	-3.58	-3.93	-4.27
-4.94	-5.60	-6.25	-6.89	-7.53
-8.78	-10.01	-11.23	-12.43	-13.62
-15.97	-18.28	-20.55	-22.80	-25.02
-29.40	-33.71	-37.99	-42.25	-46.47
-50.65	-54.80	-58.91	-62.99	-67.04
-71.06	-75.05	-79.00	-82.93	-86.01

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-49.40	-47.21	-44.86	-42.52	-40.18
-37.84	-35.51	-33.17	-30.86	-28.54
-26.21	-23.87	-21.52	-19.13	-16.72
-14.28	-13.05	-11.81	-10.55	-9.28
-7.97	-7.31	-6.63	-5.94	-5.24
-4.92	-4.14	-3.76	-3.37	-2.97
-2.56	-2.34	-2.12	-1.90	-1.66
-1.42	-1.29	-1.16	-1.02	-.89
-.73	-.64	-.55	-.46	-.36
-.25	-.13	0.00	.16	.31
.52	.80	.69	.95	1.00
1.03	1.06	1.08	1.10	1.12
1.14	1.15	1.15	1.15	1.15
1.14	1.11	1.08	1.03	.99
.87	.75	.61	.46	.30
-.95	-.42	-.82	-1.24	-1.67
-2.38	-3.35	-4.36	-5.62	-6.71
-9.00	-11.43	-13.99	-16.66	-19.39
-22.10	-25.02	-27.92	-30.86	-33.84
-36.87	-39.94	-43.05	-46.20	-49.40

BATHI

C	HS	UHK	DEFIS	ETAIS	ALUC	DIANG	DEC	DENIE	BUDE	XCHO	DYCHO	Q	COTA
100.0	99.	10.	7650	1.20	.635	45.0	1.06	.917	750	500.	10	160.	010000

SUT	YCHS	LENS	SLFROM	SLUPTO	COUPLE	DTCC	PROFILE	ALF	ALFA	YCHOX
0.	-80.0	0.	0.	0.	0.	.00250	2409	0.0	30.0	30.0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

UN	VISCI	ETAS	DEP	GLU	XCHLP	SG	COTO	FLAND	COFUB	DALF
514.80	.1457	17.07	160.00	1005.41	-167.7	1	0001000	.027449	770664	30.0

YCHO= -80. NSSF= 0.030

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

XCHLP REACHED

YCHO= -70. NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DYCN	DYC	REYNR

XCHLP REACHED

YCHO= -60. NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

XCHLP REACHED

YCHO= -50. NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

```
XGNLP REACHED

YGHO= -40.      HSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
XGNLP REACHED

YGHO= -30.      HSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
XGNLP REACHED

YGHO= -20       HSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
XGNLP REACHED

YGHO= -10.      HSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
XGNLP REACHED

YGHO= 0.0       HSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
XGNLP REACHED
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A-1/082.3 Imprenta del INTA

```
YGNO= 10.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNN

    XGNLP REACHED

YGNO= 20.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNN

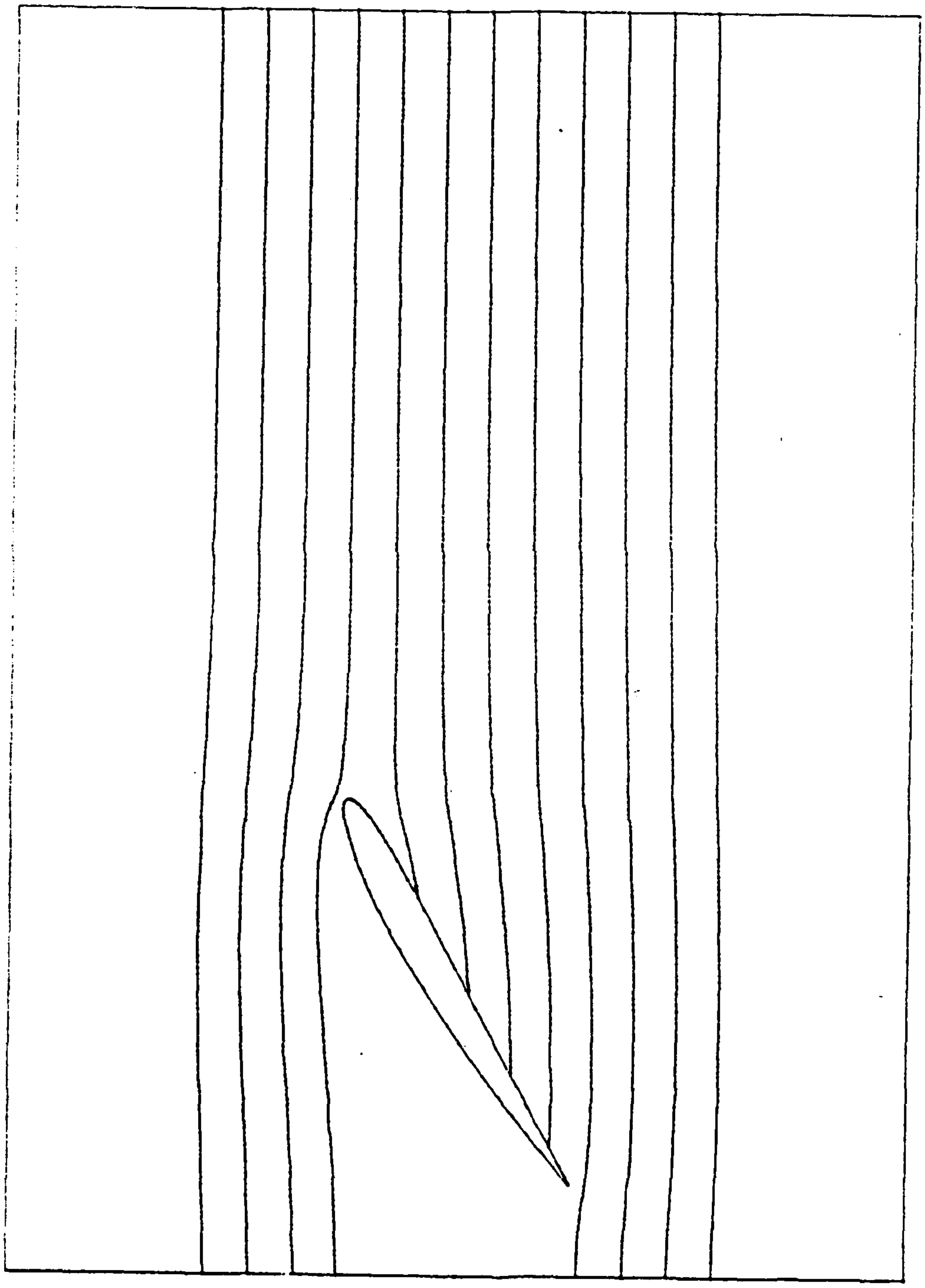
    XGNLP REACHED

YGNO= 30.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNN

    XGNLP REACHED
```

A-4/008.3 Imprenta del INTA



A-1/002.3 Imprenta del INTA

ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.08
75.14	77.60	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.19
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.56
99.48	99.37	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.23
84.76	82.28	79.80	77.32	74.84
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.89	-.81
-.73	-.64	-.53	-.38	-.01
.01	.40	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.70	.92	.09

ACTUAL ANGLE OF ATTACK: 30.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-86.81	-82.26	-77.81	-73.37	-68.93
-64.50	-60.07	-55.65	-51.23	-46.81
-42.40	-38.00	-33.61	-29.20	-24.75
-20.32	-18.10	-15.91	-13.72	-11.55
-9.41	-8.34	-7.28	-6.24	-5.21
-4.19	-3.68	-3.20	-2.71	-2.23
-1.77	-1.54	-1.31	-1.09	-.86
-.67	-.57	-.48	-.39	-.30
-.21	-.17	-.13	-.09	-.06
-.03	-.01	0.00	-.01	-.16
-.16	-.47	-.64	-.79	-.93
-1.06	-1.18	-1.30	-1.42	-1.54
-1.74	-1.94	-2.13	-2.32	-2.51
-2.87	-3.23	-3.58	-3.93	-4.27
-4.94	-5.60	-6.25	-6.89	-7.53
-8.78	-10.01	-11.23	-12.43	-13.62
-15.97	-18.28	-20.55	-22.80	-25.02
-29.40	-33.71	-37.99	-42.25	-46.47
-50.65	-54.80	-58.91	-62.99	-67.04
-71.06	-75.05	-79.00	-82.93	-86.81

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-49.40	-47.21	-44.86	-42.52	-40.18
-37.84	-35.51	-33.19	-30.86	-28.54
-26.21	-23.87	-21.52	-19.13	-16.72
-14.28	-13.05	-11.81	-10.55	-9.28
-7.97	-7.31	-6.63	-5.94	-5.24
-4.52	-4.14	-3.76	-3.37	2.97
-2.56	-2.34	-2.12	-1.90	-1.66
-1.42	-1.29	-1.16	-1.02	-.88
-.73	-.64	-.55	-.46	-.35
-.25	-.13	[illegible]	.16	.51
.52	.80	.89	.95	1.00
1.03	1.06	1.08	1.10	1.12
1.16	1.15	1.15	1.15	1.15
1.14	1.11	1.08	1.03	.99
.87	.75	.61	.46	.30
-.05	-.42	-.82	-1.24	-1.67
-2.58	-3.55	-4.56	-5.62	-6.71
-9.00	-11.43	-13.99	-16.66	-19.33
-22.18	-25.02	-27.92	-30.86	-33.84
-36.87	-39.94	-43.05	-46.20	-49.40

A-1/002.3 Imprenta del INTA

```
DATA:

    C        NS      UNK     DEFIS    ETAIS     ALVC     DIANG    DEC     CENIC    RUGE     XCHO    DYCHO      Q        COTA
  100.0      99.     10.     7650.    1.20      .635     40.0     1.00    .517     .750     500.    10.       100.    .010000

   SUT     YCHO     LENS    SLFROM    SLUPTO    COUPLE    DTCC    PROFILE    ALF     ALFA    YCHOX
   0.      -80.0    0.      0.        0.        0         .00250   2409      0.0     30.0    30.0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

    UN      VISCI    ETAS     BEP      GLU      XCHLP     SW      COTO       PLAND     COFUO      DALF
  314.80    .1457    17.87   100.00   1005.41   -107.7    1.     .0001000   .627449   .770664    30.0


 YCHO= -80.     NSSF= 1.000

    S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYG      DXG      DXCN      DYG      REYNN

     XCHLP REACHED


 YCHO= -70.     NSSF= 1.000

    S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYG      DXG      DXCN      DYG      REYNN

     XCHLP REACHED


 YCHO= -60.     NSSF= 1.000

    S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYG      DXG      DXCN      DYG      REYNN

     XCHLP REACHED


 YCHO= -50.     NSSF= 1.000

    S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYG      DXG      DXCN      DYG      REYNN
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A-1/002.3 Imprenta del INTA

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XCNLP REACHED

YCNO= -40.      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXG      UYG      DXG      DXCN      DYG      REYNN

  THE DROPLET HITS THE SURFACE

  YCNO1=  -50.000  YCNO2=  -40.000

YCNO= -30.      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXG      UYG      DXG      DXCN      DYG      REYNN

  THE DROPLET HITS THE SURFACE.

YCNO= -20.      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXG      UYG      DXG      DXCN      DYG      REYNN

  THE DROPLET HITS THE SURFACE.

YCNO= -10.      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXG      UYG      DXG      DXCN      DYG      REYNN

  THE DROPLET HITS THE SURFACE.

YCNO=  0.0      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXG      UYG      DXG      DXCN      DYG      REYNN

  XCNLP REACHED
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A-1/002.3 Imprenta del INTA

A-4/002.3 Imprenta del INTA

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YGN03=  -10.000  YGN04=   0.0000

YGN0= 10.0      NSSF= 1.000

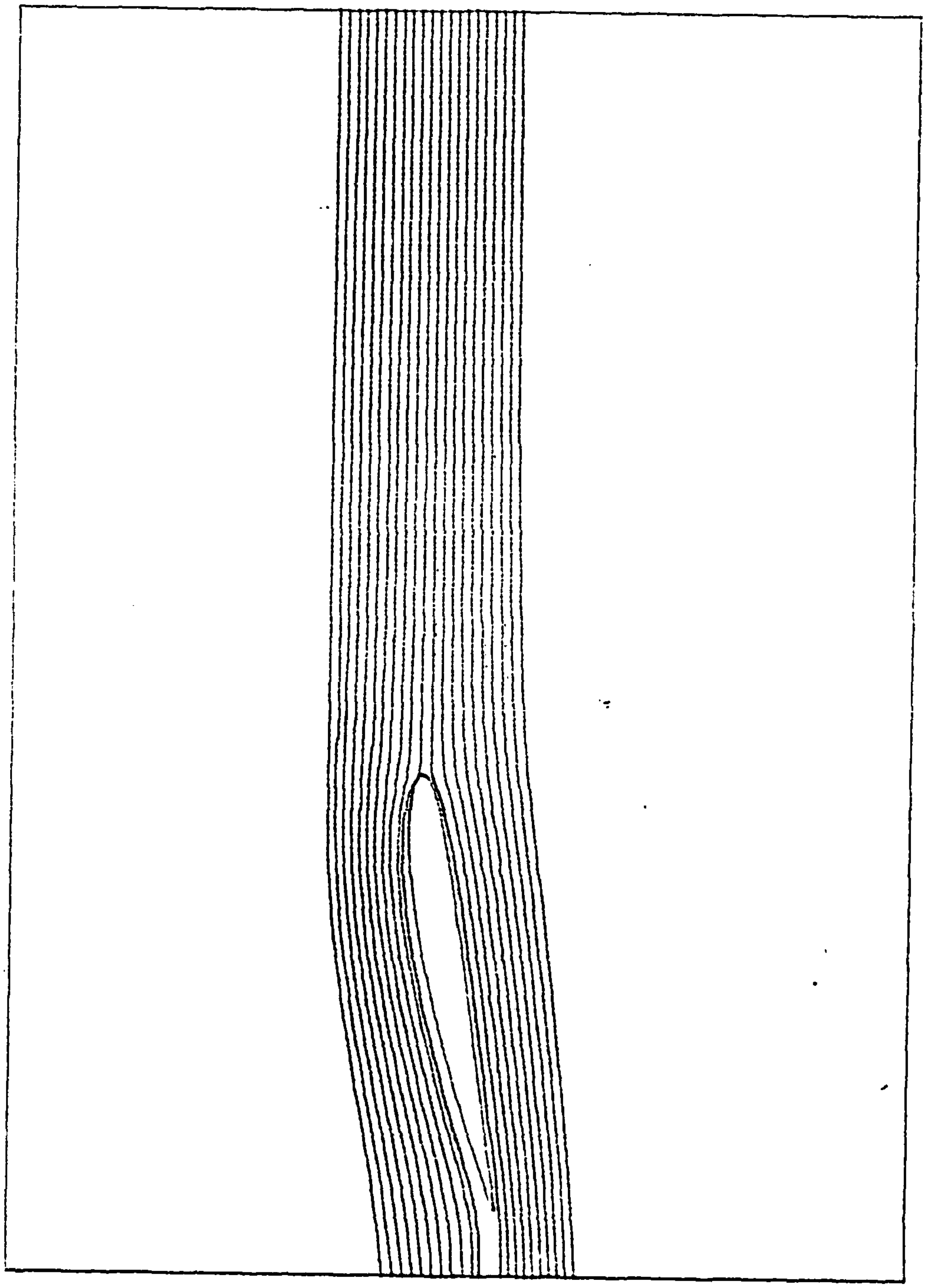
 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNR
  XGNLP REACHED

YGN0= 20.0      NSSF= 1.000

 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNR
  XGNLP REACHED

YGN0= 30.0      NSSF= 1.000

 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNR
  XGNLP REACHED
```



A-4002.3 Imprenta del INTA

ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK.

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.08	40.09	45.07
50.06	55.03	60.01	65.03	70.00
75.14	77.60	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.30	97.60	97.99	98.25
98.51	98.74	98.89	99.04	99.19
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.58
99.48	99.39	99.29	99.20	99.11
98.90	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.65
96.04	95.10	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.01	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.83	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.88	-.81
-.73	-.64	-.53	-.38	-.01
.01	.40	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.99	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.32	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.70	.92	.09

ACTUAL ANGLE OF ATTACK: 10.00 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-99.52	-93.49	-88.51	-83.53	-78.56
-73.60	-68.64	-63.69	-58.74	-53.79
-48.85	-43.92	-38.99	-34.03	-29.02
-24.03	-21.52	-19.03	-16.55	-14.07
-11.61	-10.33	-9.16	-7.94	-6.73
-5.53	-4.93	-4.34	-3.75	-3.16
-2.58	-2.29	-2.00	-1.72	-1.44
-1.16	-1.03	-.69	-.76	-.62
-.53	-.43	-.36	-.29	-.22
-.16	-.10	-.04	0.46	-.02
-.02	-.21	-.30	-.46	-.57
-.68	.79	-.90	-1.00	-1.11
-1.23	-1.47	-1.65	-1.83	-2.00
-2.33	-2.70	-3.04	-3.39	-3.72
-4.39	-5.05	-5.71	-6.37	-7.02
-8.31	-9.60	-10.88	-12.15	-13.41
-15.93	-18.43	-20.92	-23.40	-25.85
-30.75	-35.63	-40.53	-45.44	-50.34
-55.22	-60.09	-64.95	-69.79	-74.62
-79.43	-84.23	-89.01	-93.77	-98.52

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-16.09	-16.39	-15.70	-15.02	-14.34
-13.66	-12.98	-12.31	-11.64	-10.97
-10.29	-9.59	-8.89	-8.15	-7.40
-6.63	-6.23	-5.81	-5.38	-4.92
-4.43	-4.17	-3.90	-3.61	-3.30
-2.97	-2.79	-2.60	-2.40	-2.19
-1.96	-1.84	-1.71	-1.57	-1.42
-1.26	-1.17	-1.08	-.99	-.88
-.77	-.71	-.63	-.56	-.48
-.38	-.28	-.16	0.00	.36
.39	.75	.83	1.00	1.09
1.17	1.24	1.30	1.36	1.42
1.50	1.59	1.65	1.72	1.78
1.89	1.99	2.08	2.16	2.23
2.35	2.46	2.55	2.63	2.69
2.69	2.87	2.91	2.93	2.93
2.88	2.76	2.58	2.36	2.09
1.44	.63	-.31	-1.36	-2.49
-3.68	-4.93	-6.24	-7.61	-9.03
-10.50	-12.02	-13.59	-15.21	-16.89

DATA:

C	NS	UNK	DEFIS	ETAIS	ALUC	DIANG	DEG	DEHIC	RDDE	XGNO	DYGNO	B	COTA
155.0	99	10	7630	1.20	635	40.0	1.00	917	750	500	2.0	100.	010000

SUT	YGNO	LENS	SLFROM	SLUPTO	COUPLE	DISC	PROFILE	ALF	ALFA	YGNOX
0	-20.0	0.	0.	0.	0.	.06250	2409	0.0	10.0	20.0

AUXILIAR PARAMETERS CALCULATED BY AIP67 PROGRAM:

UM	VISCI	ETAS	BEP	CLU	XGNLP	SU	COFO	FLANG	COFUG	DALF
5.4 33	.1437	17.37	100.00	1005.41	--313.5	1.	0001560	.027449	270664	10.6

YGNO= -20.   NSSF= 0.600

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

XGNLP REACHED

YGNO= -18.   NSSF= 0.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

XGNLP REACHED

YGNO= -16.   NSSF= 0.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

XGNLP REACHED

YGNO= -14.   NSSF= 0.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

A-1/002.3 Imprenta del INTA

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YGHLP REACHED

[illegible]            NSSF= [illegible]

 S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
  XGHLP REACHED

YGNO= -10.      NSSF= 0.000

 S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
  XGHLP REACHED

YGNO= -8.0      NSSF= 0.000

 S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
  XGHLP REACHED

YGNO= -6.0      NSSF= 0.000

 S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
  XGHLP REACHED

YGNO= -4.0      NSSF= 0.000

 S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
  XGHLP REACHED
```

A-[illegible] Imprenta del INTA

```
YGNO= -2.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNR

   XGNLP REACHED

YGNO=  0.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNR

   XGNLP REACHED

YGNO=  2.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNR

   XGNLP REACHED

YGNO=  4.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNR

   XGNLP REACHED

YGNO=  6.0     NSSF= 0.000

  S      T      XN      XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN      DYG      REYNR

   XGNLP REACHED

YGNO=  8.0     NSSF= 0.000
```

A-1/002.3 Imprenta del INTA

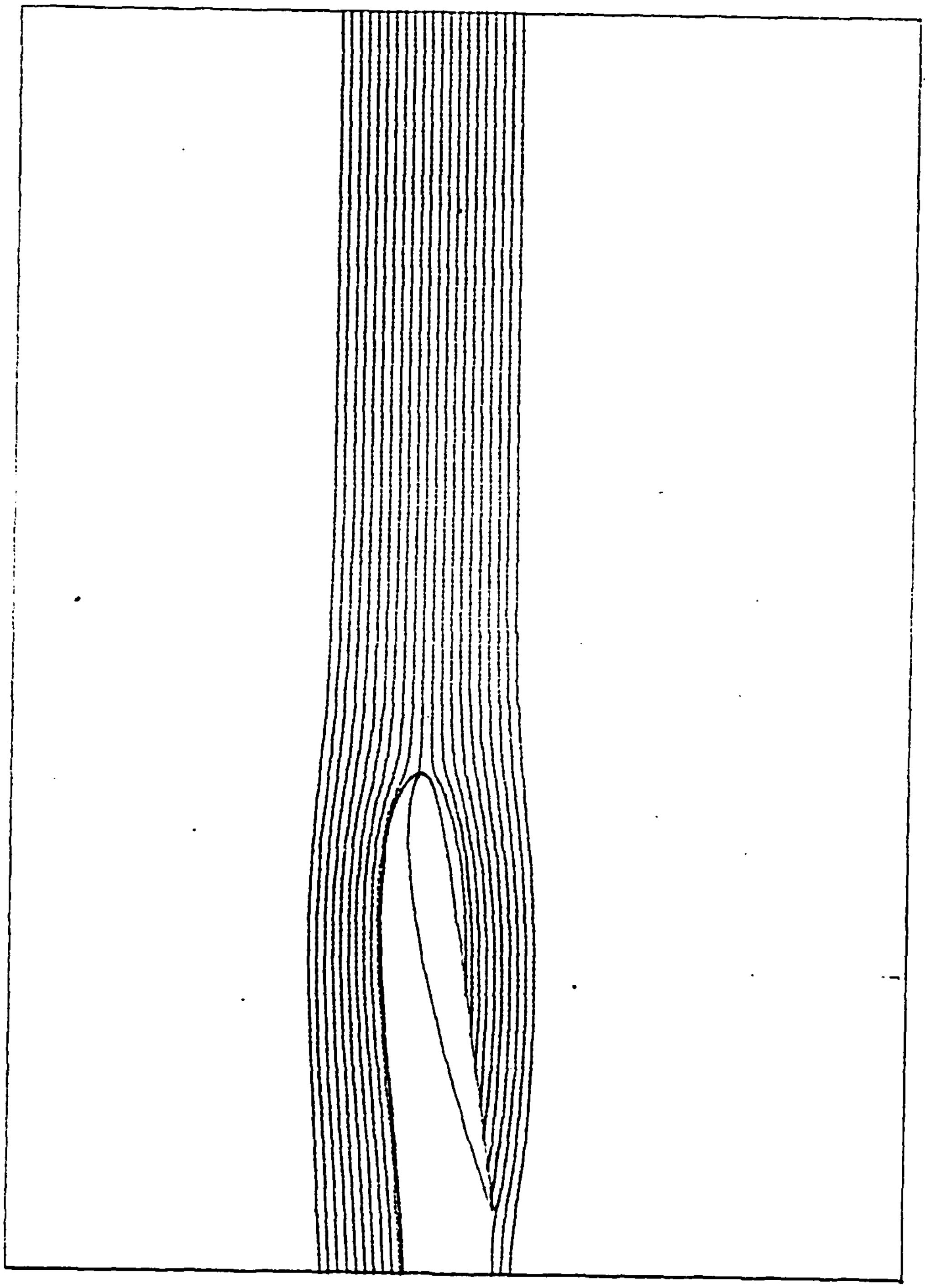
```
S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
  XCHLP REACHED

YCHO= 10.0     NSSF= 0.000
S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
  XCHLP REACHED

YCHO= 12.0     NSSF= 0.000
S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
  XCHLP REACHED

YCHO= 14.0     NSSF= 0.000
S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
  XCHLP REACHED

YCHO= 16.0     NSSF= 0.000
S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
  XCHLP REACHED

YCHO= 18.0     NSSF= 0.000
S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
  XCHLP REACHED
```

YCHG= 26.0   NSSF= 6.000

S T XN XG XCN YCN UXF UYF UXC UYC DXG DXCN DYC FEYNN

XGNLP REACHED

A-1/002.3 Imprenta del INTA



ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.00
75.16	77.60	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.31	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.58
99.40	99.39	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.32	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.20	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.78
-2.72	-2.64	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.35	-1.29	-1.22	-1.14
-1.03	-1.00	-.94	-.80	-.81
-.73	-.64	-.53	-.30	-.01
.01	.40	.56	.69	.83
.89	.98	1.05	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.87	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.62	4.11	4.33	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.76	.92	.09

A-1/002.8 Imprenta del INTA

ACTUAL ANGLE OF ATTACK: 10.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-98.52	-93.49	-88.51	-83.53	-78.56
-73.60	-68.64	-63.69	-58.74	-53.79
-48.85	-43.92	-38.99	-34.03	-29.02
-24.03	-21.52	-19.03	-16.55	-14.07
-11.61	-10.30	-9.16	-7.94	-6.73
-5.53	-4.93	-4.34	-3.75	-3.16
-2.58	-2.29	-2.00	-1.72	-1.44
-1.16	-1.03	-.89	-.76	-.62
-.50	-.43	-.36	-.29	-.22
-.16	-.10	-.04	0.00	-.02
-.62	-.20	-.34	-.46	-.57
-.68	-.79	-.90	-1.00	-1.11
-1.29	-1.47	-1.65	-1.83	-2.00
-2.35	-2.70	-3.04	-3.39	-3.72
-4.39	-5.05	-5.71	-6.37	-7.02
-8.31	-9.60	-10.88	-12.15	-13.41
-15.93	-18.43	-20.92	-23.40	-25.85
-30.75	-35.63	-40.53	-45.44	-50.34
-55.22	-60.09	-64.95	-69.79	-74.62
-79.43	-84.23	-89.01	-93.77	-98.52

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-16.89	-16.37	-15.70	-15.02	-14.34
-13.66	-12.98	-12.31	-11.64	-10.97
-10.24	-9.59	-8.88	-8.15	-7.40
-6.63	-6.23	-5.81	-5.38	-4.92
-4.43	-4.17	-3.90	-3.61	-3.30
-2.97	-2.79	-2.60	-2.40	-2.19
-1.96	-1.86	-1.71	-1.57	-1.42
-1.26	-1.17	-1.08	-.97	-.88
-.77	-.71	-.63	-.56	-.48
-.38	-.28	-.16	0.00	.20
.39	.75	.89	1.00	1.09
1.17	1.24	1.30	1.36	1.42
1.50	1.58	1.65	1.72	1.79
1.89	1.99	2.08	2.16	2.23
2.35	2.46	2.55	2.63	2.69
2.80	2.87	2.91	2.93	2.93
2.60	2.76	2.58	2.36	2.09
1.44	.63	-.31	-1.36	-2.49
-3.68	-4.93	-6.24	-7.61	-9.03
-10.50	-12.02	-13.59	-15.21	-16.89

A-1/002.3 Imprenta del INTA

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DATA:

 C      NS     UNK    DEFIS   ETAIS   ALUC   DIANG   DEC    DENIC   RODE    XGNO   DYGNO    Q     COTA
100 0   99.    10.    7650.   1.20    .635   40.0    1.00   .917    .750    500.   2.0     100   .010000

SUT    YGNO    LENS   SLFRBX   SLUPTO   COUPLE   DTEC    PROFILE   ALF    ALFA   YGNOX
 0.    -20.0   0.     0        0.       0.       .00250  2409      0.0    10 0   20.0

AUXILIAR PARAMETERS CALCULATED BY AIPO7 PROGRAM:

 UN      VISCI   ETAS    SEP     CLU      XGNLP    SU    COTO      BLAND     COFUB     DALF
514 80   .1457   17.87   100.00  1005.41  -113.5   1.    .0001000  .027449   .770664   10.0

YGNO= -20.    NSSF= 1 000

 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN

 XGNLP REACHED

YGNO= -18.    NSSF= 1 000

 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN

 XGNLP REACHED

YGNO= -16.    NSSF= 1.000

 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN

 XGNLP REACHED

YGNO= -14.    NSSF= 1.000

 S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
```

THE DROPLET HITS THE SURFACE

YGN01= -16.000 YGN02= -14.000

YGN0= -12. NSSF= 1.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

THE DROPLET HITS THE SURFACE.

YGN0= -10. NSSF= 1.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

THE DROPLET HITS THE SURFACE.

YGN0= -8.0 NSSF= 1.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

THE DROPLET HITS THE SURFACE.

YGN0= -6.0 NSSF= 1.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

THE DROPLET HITS THE SURFACE.

YGN0= -4.0 NSSF= 1.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNN

THE DROPLET HITS THE SURFACE.

YGN0= -2.0 NSSF= 1.000

A-1/002.3 Imprenta del INTA

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 S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

 THE DROPLET HITS THE SURFACE.

YGNO=  0.0      NSSF= 1.000

 S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

 XGNLP REACHED

 YGN03=  -2.0030  YGN04=   0.0000

YGNO=  2.0      NSSF= 1.000

 S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

 XGNLP REACHED

YGNO=  4.0      NSSF= 1.000

 S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

 XGNLP REACHED

YGNO=  6.0      NSSF= 1.000

 S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

 XGNLP REACHED

YGNO=  8.0      NSSF= 1.000

 S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
```

A-4002.3 Imprenta del INTA

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     XGHLP REACHED

   YGN0= 10.0     NSSF= 1.000

    S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    PEYNN

     XGHLP REACHED

   YGN0= 12.0     NSSF= 1.000

    S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    PEYNN

     XGHLP REACHED

   YGN0= 14.0     NSSF= 1.000

    S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    PEYNN

     XGHLP REACHED

   YGN0= 16.0     NSSF= 1.000

    S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    PEYNN

     XGHLP REACHED

   YGN0= 18.0     NSSF= 1.000

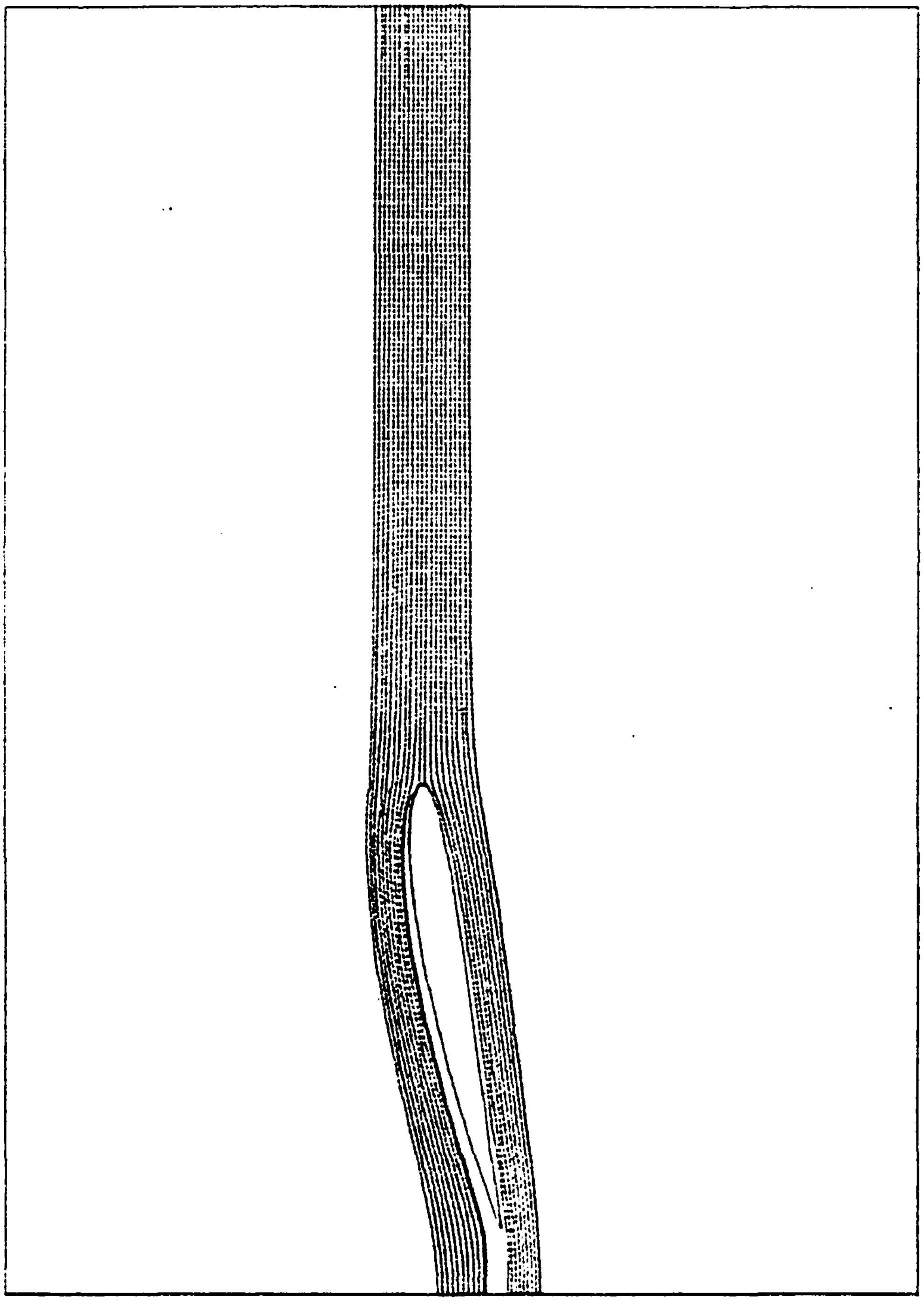
    S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    PEYNN

     XGHLP REACHED
```

YGNO= 20.0   NSSF= 1.000

S	T	XW	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNR

NGNLP REACHED



ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.60 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.08
75.14	77.68	80.20	82.72	85.24
87.75	88.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.33	99.41	99.49	99.57	99.65
99.73	99.91	99.88	99.95	100.00
100.00	99.67	99.77	99.67	99.58
99.48	99.39	99.29	99.20	99.11
98.94	98.72	98.61	98.45	98.28
97.96	97.64	97.32	97.00	96.69
96.04	95.40	94.77	94.14	93.51
92.25	89.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.39	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.88	-.81
-.73	-.64	-.53	-.39	-.01
.01	.40	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.46	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.70	.92	.09

ACTUAL ANGLE OF ATTACK: 10.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISSES OF THE POINTS LIMITING THE SEGMENTS:

-98.52	-93.49	-88.51	-83.53	-78.56
-73.60	-68.64	-63.69	-58.74	-53.79
-49.05	-43.92	-38.99	-34.03	-29.02
-24.03	-21.52	-19.03	-16.55	-14.07
-11.61	-10.36	-9.16	-7.94	-6.73
-5.53	-4.93	-4.34	-3.75	-3.16
-2.58	-2.29	-2.00	-1.72	-1.44
-1.16	-1.03	-.69	-.76	-.62
-.50	-.43	-.36	-.29	-.22
-.16	-.10	-.04	0.00	-.32
-.02	-.21	-.36	-.46	-.57
-.68	-.79	-.93	-1.00	-1.11
-1.29	-1.47	-1.65	-1.83	-2.00
-2.35	-2.70	-3.04	-3.38	-3.72
-4.39	-5.05	-5.71	-6.37	-7.02
-8.31	-9.60	-10.88	-12.15	-13.41
-15.93	-19.43	-20.92	-23.40	-25.05
-30.75	-35.63	-40.53	-45.44	-50.34
-55.22	-60.09	-64.95	-69.79	-74.62
-79.43	-84.23	-89.01	-93.77	-98.52

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-16.69	-16.33	-15.70	-15.02	-14.34
-13.65	-12.98	-12.31	-11.64	-10.97
-10.29	-9.59	-8.88	-8.15	-7.40
-6.63	-6.23	-5.81	-5.38	-4.92
-4.43	-4.17	-3.90	-3.61	-3.30
-2.97	-2.79	-2.60	-2.40	-2.19
-1.96	-1.84	-1.71	-1.57	-1.42
-1.26	-1.17	-1.08	-.99	-.88
-.77	-.71	-.63	-.56	-.48
-.38	-.28	-.16	0.00	.30
.39	.75	.89	1.00	1.09
1.17	1.24	1.30	1.36	1.42
1.50	1.58	1.65	1.72	1.78
1.89	1.99	2.08	2.16	2.23
2.35	2.46	2.55	2.63	2.69
2.80	2.87	2.91	2.93	2.93
2.88	2.76	2.58	2.36	2.09
1.44	.63	-.31	-1.36	-2.49
-3.68	-4.93	-6.24	-7.61	-9.03
-10.50	-12.02	-13.59	-15.21	-16.69

DATA:

C	NS	UNK	DEFIS	ETAIS	ALUC	DIANC	DEC	DEHIC	RODE	KCNO	DYCNO	D	COTA
100.0	99.	10.	7650.	1.20	.635	40.0	1.00	.917	.730	500.	1 0	100.	.010000

SJT	YCNO	LENS	SLFRDN	SLUPTD	COUPLE	DTEC	PROFILE	ALF	ALFA	YCNOX
0.	-10.0	0.	0.	0.	0.	.00250	2409	0 0	10 0	10 0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

UN	VISCI	ETAS	DEP	GLU	XCNLP	SU	COTD	BLAND	COFUO	DALF
514.80	.1457	17.07	100.00	1005.41	-113.5	1.	.0001000	.027449	.770664	10.0

YCNO= -10. NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

XCNLP REACHED

YCNO= -9.0 NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

XCNLP REACHED

YCNO= -8.0 NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

XCNLP REACHED

YCNO= -7.0 NSSF= 0.000

S	T	XN	XG	XCN	YCN	UXF	UYF	UXC	UYC	DXC	DXCN	DYC	REYNR

A-4/008.3 Imprenta del INTA

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XCHLP REACHED

YCN0= -6.0     HSSF= 0.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXCN     DYG     REYNN
XCHLP REACHED

YCN0= -5.0     HSSF= 0.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXCN     DYG     REYNN
XCHLP REACHED

YCN0= -4.0     HSSF= 0.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXCN     DYG     REYNN
XCHLP REACHED

YCN0= -3.0     HSSF= 0.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXCN     DYG     REYNN
XCHLP REACHED

YCN0= -2.0     HSSF= 0.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXCN     DYG     REYNN
XCHLP REACHED
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```
YGN0= -1.0      NSSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

  THE DROPLET HITS THE SURFACE.

  YGN01=  -2.0000  YGN02=  -1.0000

YGN0=  0.0      NSSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   XGNLP REACHED

  YGN03=  -1.0000  YGN04=   0.0000

YGN0=  1.0      NSSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   XGNLP REACHED

YGN0=  2.0      NSSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   XGNLP REACHED

YGN0=  3.0      NSSF= 0.000

  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   XGNLP REACHED
```

A-4/002.3 Imprenta del INTA

```
YGHO=  4.0     NSSF= 0.400
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
   XGNLP REACHED

YGHO=  5.0     NSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
   XGNLP REACHED

YGHO=  6.0     NSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
   XGNLP REACHED

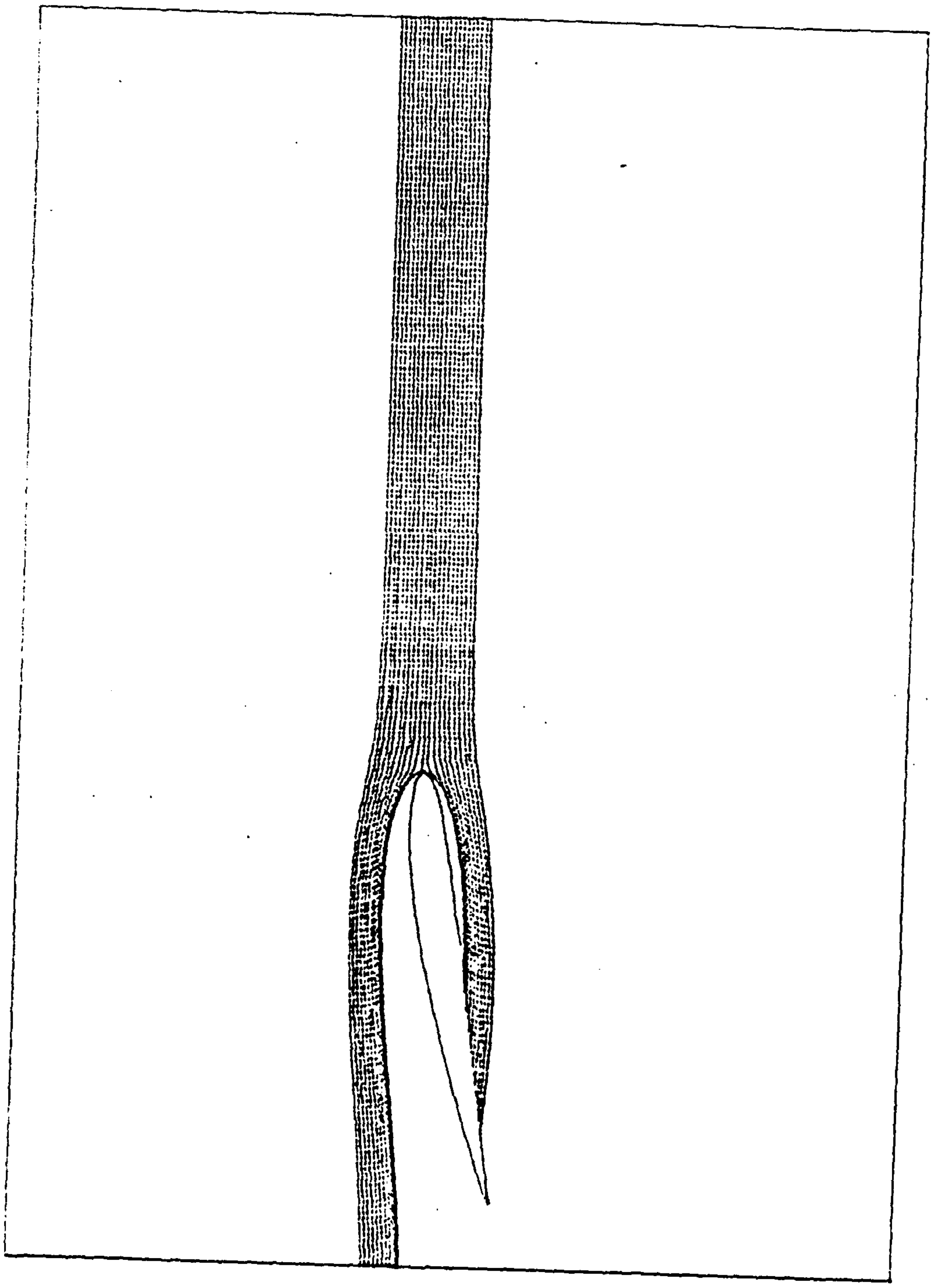
YGHO=  7.0     NSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
   XGNLP REACHED

YGHO=  8.0     NSSF= 0.000
  S       T       XN      XG      XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     REYNN
   XGNLP REACHED

YGHO=  9.0     NSSF= 0.000
```

```
     S         T         XN        XG        XCN       YCN       UXF       UYF       UXG       UYG       DXG       DXCN      DYG       REYNN
      XCNLP REACHED

 YCN0= 10.0      NSSF= 0.000
     S         T         XN        XG        XCN       YCN       UXF       UYF       UXG       UYG       DXG       DXCN      DYG       REYNN
      XCNLP REACHED
```



ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.00
75.16	77.68	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.58
99.48	99.39	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.88	-.81
-.73	-.64	-.53	-.38	-.01
.01	.40	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.53	5.20	4.75	4.25	3.65
3.08	2.41	1.70	.92	.09

ACTUAL ANGLE OF ATTACK: 10.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-98.32	-93.49	-88.51	-83.53	-78.56
-73.60	-68.64	-63.63	-58.74	-53.79
-48.85	-43.92	-38.99	-34.03	-29.02
-24.03	-21.52	-19.03	-16.55	-14.07
-11.61	-10.38	-9.16	-7.94	-6.73
-5.53	-4.93	-4.34	-3.75	-3.16
-2.58	-2.29	-2.00	-1.72	-1.44
-1.16	-1.03	-.89	-.76	-.62
-.50	-.43	-.36	-.29	-.22
-.16	-.10	-.04	0.03	-.02
-.02	-.21	-.34	-.46	-.57
-.68	-.79	-.90	-1.00	-1.11
-1.29	-1.47	-1.65	-1.83	-2.00
-2.35	-2.70	-3.04	-3.39	-3.72
-4.39	-5.05	-5.71	-6.37	-7.02
-8.31	-9.60	-10.88	-12.15	-13.41
-15.93	-18.43	-20.92	-23.40	-25.85
-30.75	-35.63	-40.53	-45.44	-50.34
-55.22	-60.69	-64.95	-69.79	-74.62
-79.43	-84.23	-89.01	-93.77	-98.52

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-16.83	-16.39	-15.70	-15.02	-14.34
-13.66	-12.98	-12.31	-11.64	-10.97
-10.29	-9.59	-8.88	-8.15	-7.40
-6.69	-6.23	-5.81	-5.38	-4.92
-4.43	-4.17	-3.90	-3.61	-3.30
-2.97	-2.79	-2.60	-2.40	-2.19
-1.96	-1.84	-1.71	-1.57	-1.42
-1.26	-1.17	-1.09	-.99	-.88
-.77	-.71	-.63	-.56	-.48
-.38	-.28	-.16	0.00	.30
.39	.75	.89	1.00	1.09
1.17	1.24	1.30	1.36	1.42
1.50	1.58	1.65	1.72	1.78
1.89	1.99	2.08	2.16	2.23
2.35	2.46	2.55	2.63	2.69
2.80	2.87	2.91	2.93	2.93
2.88	2.76	2.58	2.36	2.09
1.44	.63	-.31	-1.36	-2.49
-3.68	-4.93	-6.24	-7.61	-9.03
-10.50	-12.02	-13.59	-15.21	-16.89

AD A160 413 STUDY OF AEROSPACE MATERIALS COATINGS ADHESIONS AND PROCESSES AIRCRAFT IC..(U) INSTITUTO NACIONAL DE TECNICA AEROESPACIAL MADRID (SPAIN) E M RODRIGUEZ 14 SEP 84 EOARD-TR-85-091(A) AFOSR-83-0340 F/G 9/2

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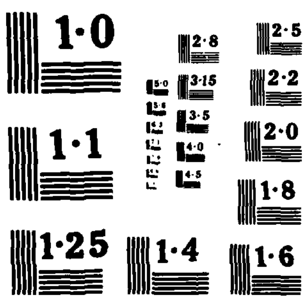
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1·6

```
DATA:

   C       HS      UNK     DEFIS   ETAIS   BLUC    DIANC   DEC     DENIC   RODE    XGNG    DYGNO   B       COTA
  190.0    99.     10.     7650    1.20    635     40.0    1.60    517     .750    500.    1.0     100.    610000

   SUT     YGNO    LENS    SLFRON  BLUPTO  COUPLE  BTCC    PROFILE ALF     ALFA    YGNOX
   0.     -10.0    0.      0.      0.      0.      .00250  2409    0.0     10.0    10.0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

   UN      VISCI   ETAS    BEP     CLU     XCHLP   SU      COTO      BLAND    COFUB    DALF
  514.00   .1457   17.07   100.00  1005.41 -113.5  1.      .0001000  .027449  770664   10.0


YGNO= -10.     NSSF= 1.000

   S       T       XN      XG      XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     FEYNN

   THE DROPLET HITS THE SURFACE.

   YGNO1=  -11.000  YGNO2=  -10.000

YGNO= -9.0     NSSF= 1.000

   S       T       XN      XG      XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     FEYNN

   THE DROPLET HITS THE SURFACE.

YGNO= -8.0     NSSF= 1.000

   S       T       XN      XG      XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN.   DYG     FEYNN

   THE DROPLET HITS THE SURFACE.

YGNO= -7.0     NSSF= 1.000

   S       T       XN      XG      XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN    DYG     FEYNN
```

THE DROPLET HITS THE SURFACE.

YGNO= -6.0 NSSF= 1.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

THE DROPLET HITS THE SURFACE.

YGNO= -5.0 NSSF= 1.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

THE DROPLET HITS THE SURFACE.

YGNO= -4.0 NSSF= 1.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

THE DROPLET HITS THE SURFACE.

YGNO= -3.0 NSSF= 1.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

THE DROPLET HITS THE SURFACE.

YGNO= -2.0 NSSF= 1.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

THE DROPLET HITS THE SURFACE.

YGNO= -1.0 NSSF= 1.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

```
THE DROPLET HITS THE SURFACE.

YGNO=  0.0      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYC      DXC      DXCN      DYC      REYNN

 XGNLP REACHED

 YGNO3=  -1.0000  YGNO4=   0.0000

YGNO=  1.0      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYC      DXC      DXCN      DYC      REYNN

 XGNLP REACHED

YGNO=  2.0      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYC      DXC      DXCN      DYC      REYNN

 XGNLF REACHED

YGNO=  3.0      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      JXC      UYC      DXC      DXCN      DYC      FEYN

 XGNLP REACHED

YGNO=  4.0      NSSF= 1.000

  S      T      XN      XG      XCN      YCN      UXF      UYF      UXC      UYC      DXC      DXCN      DYC      REYNN

 XGNLP REACHED
```

```
YGNO=  5.0      NSSF= 1.000
   S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
    XGNLP REACHED

YGNO=  6.0      NSSF= 1.000
   S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
    XGNLP REACHED

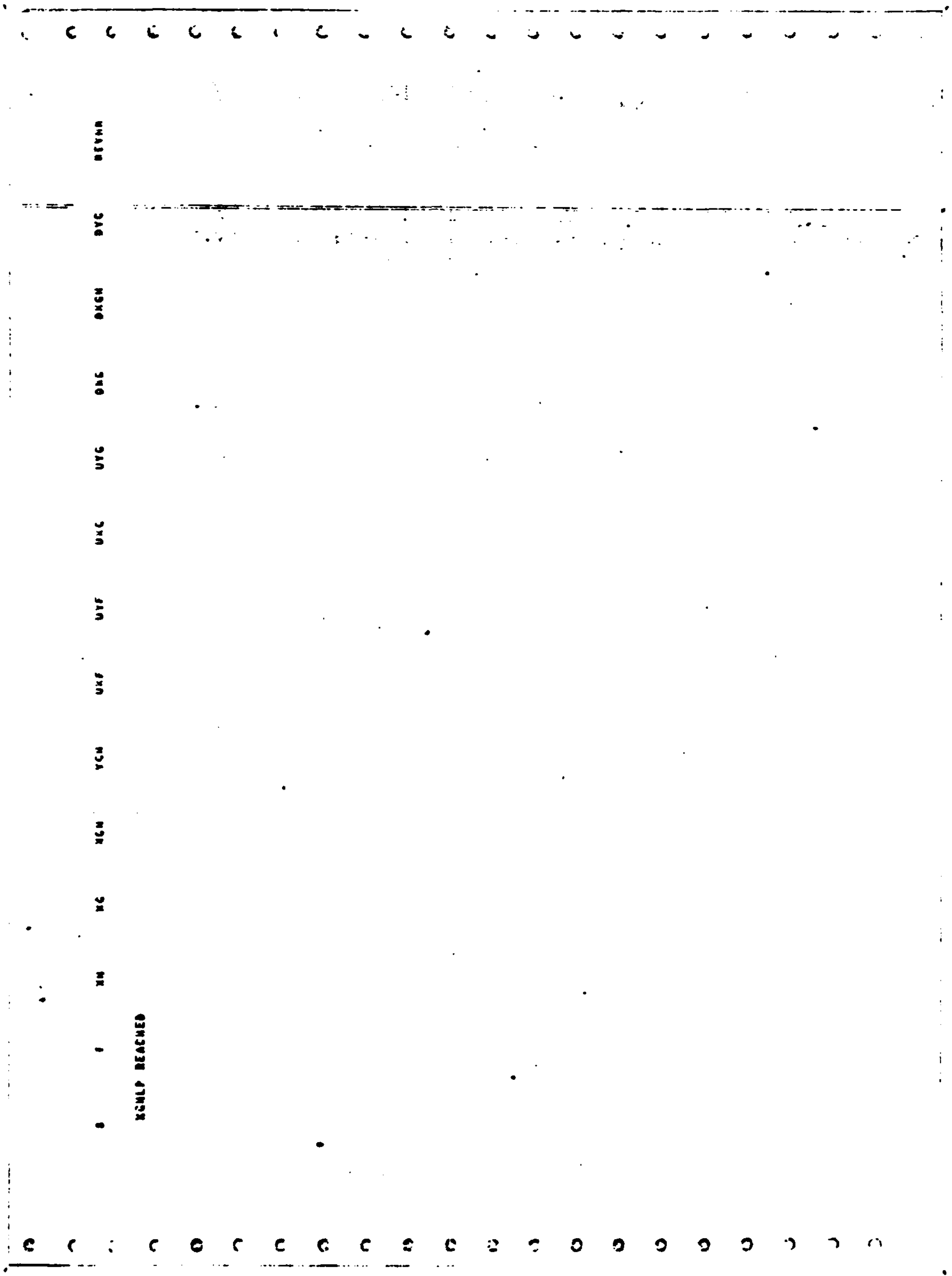
YGNO=  7.0      NSSF= 1.000
   S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
    XGNLP REACHED

YGNO=  8.0      NSSF= 1.000
   S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
    XGNLP REACHED

YGNO=  9.0      NSSF= 1.000
   S        T        XN       XG       XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN
    XGNLP REACHED

YGNO= 10.0      NSSF= 1.000
```

A-4/002.3 Imprenta del INTA


XGNLP REACHED

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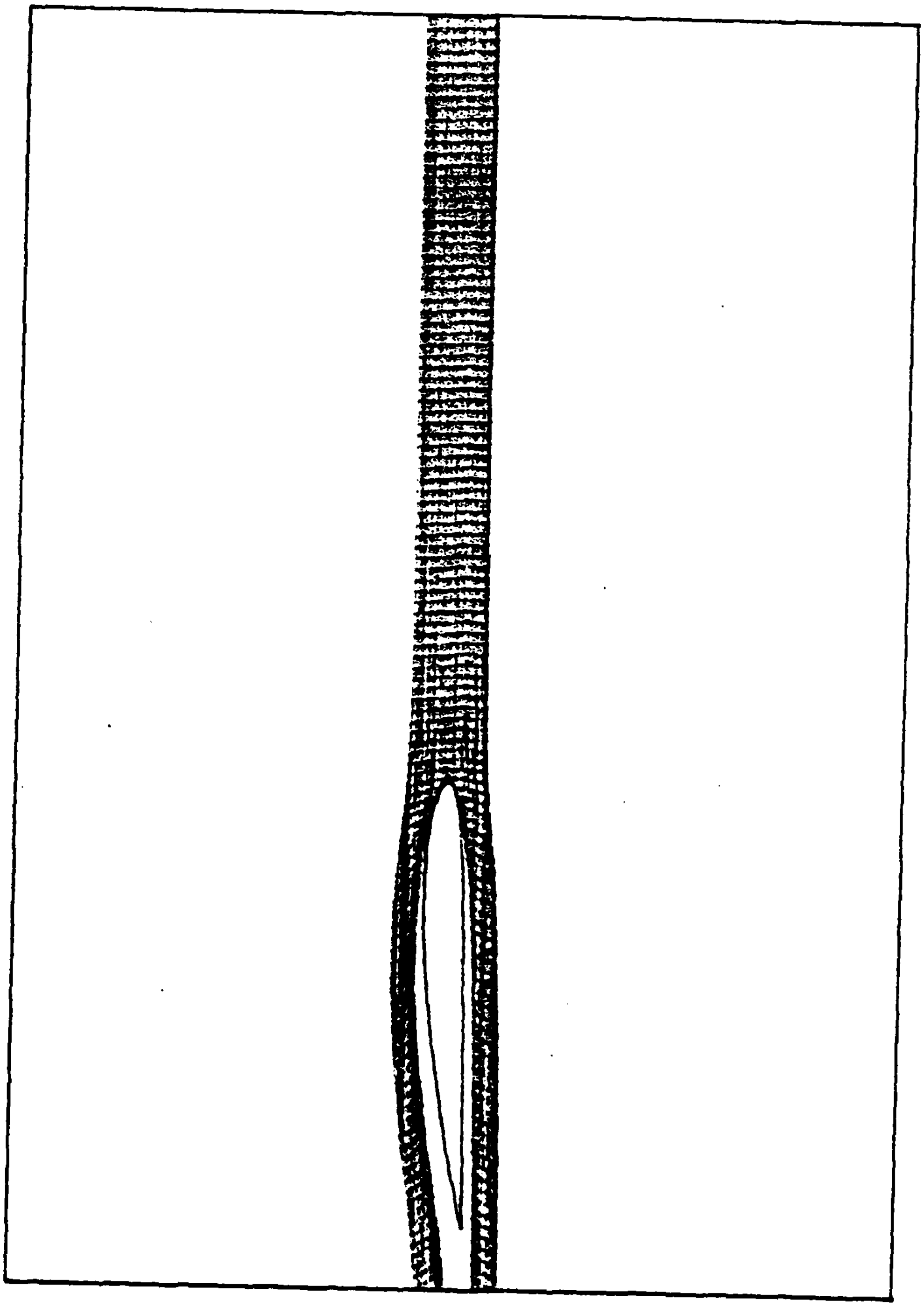


A-4882.3 Imprenta del INTA

ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES.

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.05	55.03	60.01	65.03	70.00
75.14	77.68	80.23	82.77	85.24
87.75	89.91	90.26	91.51	92.75
93.99	94.61	95.23	95.65	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.58
99.49	99.39	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.09	-.28	-.47	-.66	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.76
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.22	-2.10	-2.09	-1.95
-1.86	-1.79	-1.71	-1.62	-1.53
-1.42	-1.36	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.88	-.81
-.73	-.64	-.53	-.38	-.01
.01	.40	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.75	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.67	4.84
5.22	5.50	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.39	5.20	4.75	4.25	3.69
3.08	2.41	1.73	.02	.09

A-1/002.3 Imprenta del INTA

ACTUAL ANGLE OF ATTACK: 3.00 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-99.07	-94.02	-89.79	-84.77	-79.75
-74.74	-69.74	-64.74	-59.75	-54.76
-49.77	-44.79	-39.81	-34.79	-29.74
-24.66	-22.15	-19.63	-17.11	-14.60
-12.09	-10.04	-9.59	-6.35	-7.11
-5.83	-5.26	-4.65	-4.04	-3.43
-2.83	-2.53	-2.23	-1.93	-1.63
-1.34	-1.19	-1.05	[illegible]	-.76
-.62	-.54	-.46	-.39	-.31
-.23	-.16	-.09	-.03	0.00
-.00	-.15	-.26	-.36	-.46
-.57	-.66	-.76	-.86	-.95
-1.13	-1.30	-1.47	-1.63	-1.80
-2.13	-2.47	-2.79	-3.12	-3.45
-4.10	-4.74	-5.39	-6.03	-6.67
-7.94	-9.21	-10.47	-11.73	-12.99
-15.49	-17.99	-20.48	-22.96	-25.43
-33.30	-35.32	-40.29	-45.30	-50.30
-55.29	-60.23	-65.25	-70.23	-75.19
-83.14	-85.09	-90.03	-94.96	-99.07

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-5.13	-5.25	-5.17	-5.16	-5.03
-4.36	-4.59	-4.64	-4.77	-4.71
-4.03	-4.54	-4.44	-4.31	-4.10
-4.03	-3.93	-3.83	-3.70	-3.55
-3.36	-3.25	-3.11	-2.99	-2.83
-2.65	-2.54	-2.43	-2.30	-2.16
-2.01	-1.92	-1.82	-1.72	-1.61
-1.40	-1.42	-1.34	-1.26	-1.10
-1.00	-1.02	-.96	-.89	-.82
-.74	-.64	-.53	-.37	0.09
.01	.39	.55	.60	.70
.87	.95	1.03	1.10	1.16
1.27	1.37	1.47	1.55	1.64
1.73	1.93	2.06	2.18	2.29
2.55	2.60	2.85	3.01	3.15
3.41	3.64	3.84	4.02	4.17
4.42	4.61	4.74	4.82	4.65
4.03	4.59	4.25	3.81	3.29
2.79	2.05	1.34	.53	-.24
-1.11	-2.04	-3.02	-4.05	-5.13

A-1/002.3 Imprenta del INTA

```
DATA:

   C       NS      UNK    DEFIS   ETAIS    RLUC    DIANG    DEG    DEHIC   RDDE    XGN0   DYGN0     B      COTA
 100.0     93.     50.    7650.    1.20    .635     40.0   1.00    .917    .750    500.     .4     100.   .010000

  SHT     YGN0    LENS    SLFROM    SLUPTO    COUPLE     DTCC    PROFILE    ALF     ALFA    YGNOX
   0.     -8.0     0.       0.        0         0       .00100     2405     0.0     3.0      0.0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

   UN      VISCI    ETAS     BEP      GLU'    XGHLP     SU      COTO       RLAND    COFU0     DALF
 2574.00   .1457   17.87   100.00  1035.41   -114.2     1.   .0001000   027449   .270664     3.0


 YGN0= -8.0     NSSF= 0.000

   S       T      XN      XC      XGN     YGN     UXF     UYF     UXC     UYC     DXC     DXGN    DYC     REYNN

    XGHLP REACHED


 YGN0= -7.6     NSSF= 0.000

   S       T      XN      XC      XGN     YGN     UXF     UYF     UXC     UYC     DXC     DXGN    DYC     REYNN

    XGHLP REACHED


 YGN0= -7.2     NSSF= 0.000

   S       T      XN      XC      XGN     YGN     UXF     UYF     UXC     UYC     DXC     DXGN    DYC     REYNN

    XGHLP REACHED


 YGN0= -6.8     NSSF= 0.000

   S       T      XN      XC      XGN     YGN     UXF     UYF     UXC     UYC     DXC     DXGN    DYC     REYNN
```

```
   XCHLP REACHED

YGN0= -6.4     NSSF= 0.000
  S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
   XCHLP REACHED

YGN0= -6.0     NSSF= 0.000
  S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
   XCHLP REACHED

YGN0= -5.6     NSSF= 0.000
  S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
   XCHLP REACHED

YGN0= -5.2     NSSF= 0.000
  S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
   XCHLP REACHED

YGN0= -4.8     NSSF= 0.000
  S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN
   XCHLP REACHED
```

```
YGNO= -4.4      NSSF= 0.000
  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    FEYNN
   XGNLP REACHED

YGNO= -4.0      NSSF= 0.000
  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    FEYNN
   XGNLP REACHED

YGNO= -3.6      NSSF= 0.000
  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    FEYNN
   XGNLP REACHED

YGNO= -3.2      NSSF= 0.000
  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    FEYNN
   XGNLP REACHED

YGNO= -2.8      NSSF= 0.000
  S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    FEYNN
   XGNLP REACHED

YGNO= -2.4      NSSF= 0.000
```

```
   S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

    XGNLP REACHED

  YGN0= -2.0     NSSF= 0.000

   S      T      XN     XG     XGN    YGN    UXF    UYF*   UXG    UYG    DXG    DXGN   DYG    REYNN

    XGNLP REACHED

  YGN0= -1.6     NSSF= 0.000

   S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

    XGNLP REACHED

  YGN0= -1.2     NSSF= 0.000

   S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   THE DROPLET HITS THE SURFACE.

   YGNC1= -1.6000  YGN02= -1.2000

  YGN0=  -.8     NSSF= 0.000

   S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   THE DROPLET HITS THE SURFACE.

  YGN0=  -.4     NSSF= 0.000

   S      T      XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNN

   THE DROPLET HITS THE SURFACE.
```

A-1/002.3 Imprenta del INTA

```
YCH0=  -.0      NSSF= 0.000

  S       T       XN       XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN

  THE DROPLET HITS THE SURFACE.

YCH0=   .4      NSSF= 0.000

  S       T       XN       XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN

  THE DROPLET HITS THE SURFACE.

YCH0=   .8      NSSF= 0.000

  S       T       XN       XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN

  THE DROPLET HITS THE SURFACE.

YCH0=  1.2      NSSF= 0.000

  S       T       XN       XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN

  THE PROPLET HITS THE SURFACE.

YCH0=  1.6      NSSF= 0.063

  S       T       XN       XG      XGN      YGN      UXF      UYF      UXG      UYG      DXG      DXGN     DYG      REYNN

   XCHLP REACHED

  YCH03=   1.2000  YCH04=   1.6000

YCH0=  2.0      NSSF= 0.000
```

A-4/008.3 Imprenta del INTA

```
  S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN  DYG   REYNN
   XCHLP REACHED

 YCNO=  2.4     NSSF= 0.000
  S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN  DYG   REYNN
   XCHLP REACHED

 YCNO=  2.8     NSSF= 0.000
  S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN  DYG   REYNN
   XCHLP REACHED

 YCNO=  3.2     NSSF= 0.000
  S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN  DYG   REYNN
   XCHLP REACHED

 YCNO=  3.6     NSSF= 0.000
  S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN  DYG   REYNN
   XCHLP REACHED

 YCNO=  4.0     NSSF= 0.000
  S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN  DYG   REYNN
   XCHLP REACHED
```

A-4/002.3 Imprenta del INTA

YGNO= 4.4 NSSF= 0.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

XGNLP REACHED

YGNO= 4.8 NSSF= 0.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

XGNLP REACHED

YGNO= 5.2 NSSF= 0.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

XGNLP REACHED

YGNO= 5.6 NSSF= 0.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

XGNLP REACHED

YGNO= 6.0 NSSF= 0.000

S T XN XG XGN YGN UXF UYF UXG UYG DXG DXGN DYG REYNN

XGNLP REACHED

YGNO= 6.4 NSSF= 0.000

A-1/882.3 Imprenta del INTA

```
S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN   DYG   REYNN
 XCHLP REACHED

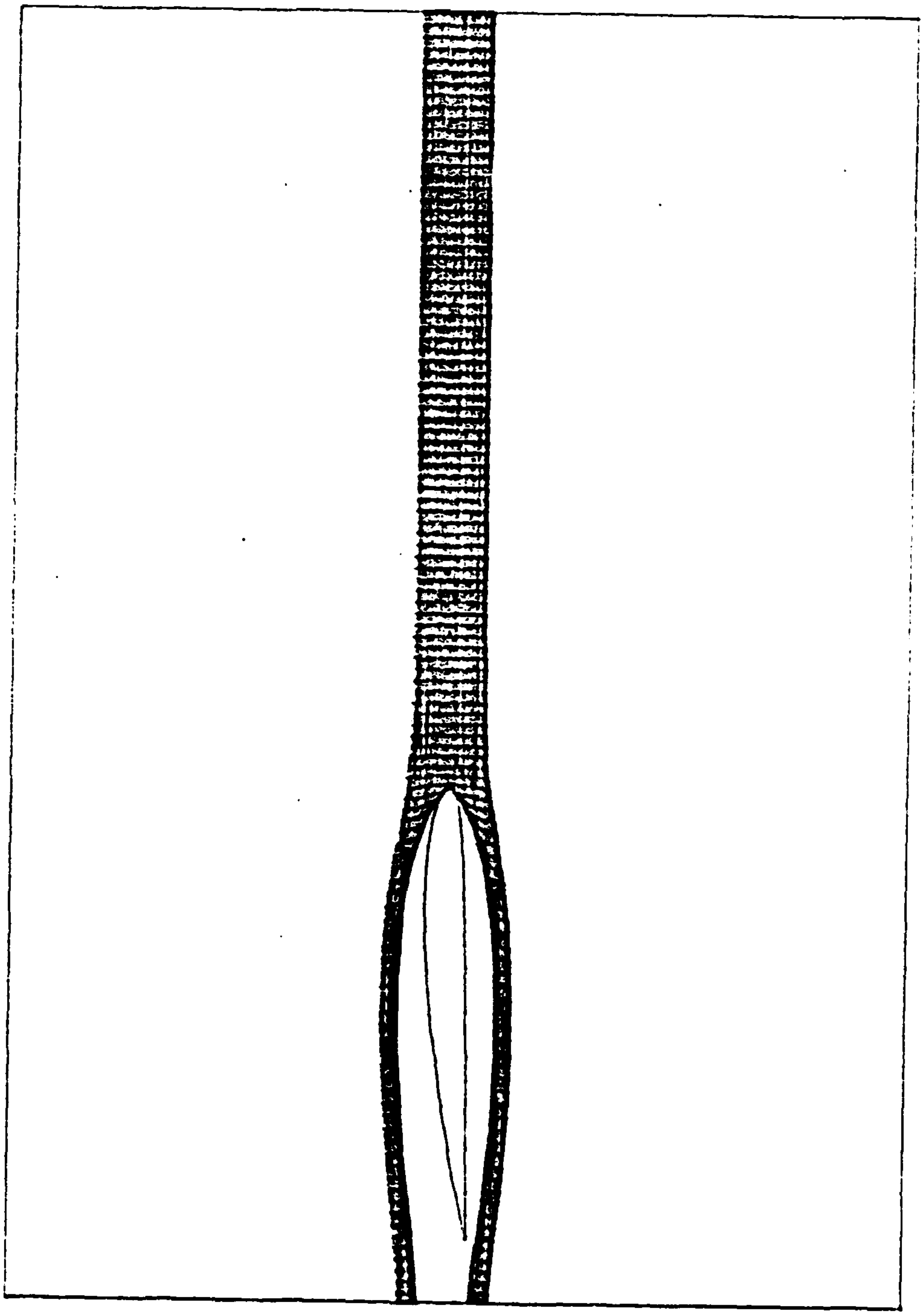
YCNO=  6.0     NSSF= 0.000
S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN   DYG   REYNN
 XCHLP REACHED

YCNO=  7.2     NSSF= 0.000
S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN   DYG   REYNN
 XCHLP REACHED

YCNO=  7.6     NSSF= 0.000
S     T     XN    XG    XCN   YCN   UXF   UYF   UXG   UYG   DXG   DXCN   DYG   REYNN
 XCHLP REACHED

YCNO=  9.0     NSSF= 0.066
S     T     XN    YG    XCN   YCN   UYF   UYF   UYG   UYG   DXG   DXCN   DYG   REYNN
 XCHLP REACHED
```

A-4/002.8 Imprenta del INTA



ANGLE OF ATTACK AT WHICH THE PROFILE IS DEFINED : 0.00 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISSES OF THE POINTS LIMITING THE SEGMENTS:

0.00	5.04	10.06	15.08	20.09
25.10	30.10	35.09	40.09	45.07
50.06	55.03	60.01	65.03	70.06
75.14	77.60	80.20	82.72	85.24
87.75	89.01	90.26	91.51	92.75
93.99	94.61	95.23	95.85	96.46
97.07	97.38	97.68	97.99	98.29
98.59	98.74	98.89	99.04	99.18
99.33	99.41	99.49	99.57	99.65
99.73	99.81	99.88	99.95	100.00
100.00	99.87	99.77	99.67	99.56
99.40	99.39	99.29	99.20	99.11
98.94	98.78	98.61	98.45	98.29
97.96	97.64	97.32	97.00	96.68
96.04	95.40	94.77	94.14	93.51
92.25	90.99	89.74	88.49	87.25
84.76	82.28	79.80	77.32	74.86
69.92	64.97	59.99	54.97	49.94
44.93	39.91	34.91	29.90	24.90
19.91	14.92	9.94	4.96	0.00

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-.03	-.28	-.47	-.64	-.85
-1.05	-1.25	-1.45	-1.64	-1.84
-2.03	-2.20	-2.35	-2.49	-2.63
-2.74	-2.77	-2.80	-2.80	-2.78
-2.73	-2.68	-2.63	-2.55	-2.46
-2.34	-2.27	-2.19	-2.09	-1.99
-1.96	-1.79	-1.71	-1.62	-1.53
-1.42	-1.35	-1.29	-1.22	-1.14
-1.05	-1.00	-.94	-.84	-.81
-.73	-.64	-.53	-.30	-.01
.41	.43	.56	.69	.80
.89	.98	1.06	1.14	1.21
1.33	1.44	1.54	1.63	1.72
1.89	2.05	2.19	2.33	2.46
2.70	2.92	3.12	3.31	3.49
3.82	4.11	4.38	4.62	4.84
5.22	5.54	5.80	6.01	6.17
6.38	6.43	6.35	6.17	5.91
5.59	5.20	4.75	4.25	3.69
3.08	2.41	1.70	.92	.09

A-4/002.3 Imprenta del INTA

ACTUAL ANGLE OF ATTACK: 3.00 DEGREES

DEFINITION OF THE PROFILE AT THIS ANGLE OF ATTACK:

ABSCISES OF THE POINTS LIMITING THE SEGMENTS:

-99.07	-94.02	-89.79	-84.77	-79.75
-74.74	-69.74	-64.74	-59.75	-54.76
-49.77	-44.79	-39.81	-34.79	-29.74
-24.68	-22.15	-19.63	-17.11	-14.60
-12.69	-10.84	-9.59	-8.35	-7.11
-5.88	-5.26	-4.65	-4.04	-3.43
-2.83	-2.53	-2.23	-1.93	-1.63
-1.34	-1.19	-1.05	-.90	-.76
-.62	-.54	-.46	-.39	-.31
-.23	-.16	-.09	-.03	0.00
-.09	-.15	-.26	-.36	-.46
-.57	-.66	-.76	-.86	-.95
-1.13	-1.30	-1.47	-1.63	-1.80
-2.13	-2.47	-2.79	-3.12	-3.45
-4.10	-4.74	-5.39	-6.03	-6.67
-7.94	-9.21	-10.47	-11.73	-12.98
-15.49	-17.99	-20.48	-22.96	-25.43
-30.38	-35.32	-40.23	-45.30	-50.30
-55.29	-60.28	-65.25	-70.23	-75.19
-80.14	-85.09	-90.03	-94.96	-99.07

ORDENATES OF THE POINTS LIMITING THE SEGMENTS:

-5.13	-5.25	-5.17	-5.10	-5.03
-4.96	-4.90	-4.83	-4.77	-4.71
-4.63	-4.54	-4.44	-4.31	-4.18
-4.03	-3.93	-3.83	-3.70	-3.55
-3.36	-3.25	-3.13	-2.99	-2.83
-2.65	-2.54	-2.43	-2.30	-2.16
-2.01	-1.92	-1.82	-1.72	-1.61
-1.49	-1.42	-1.34	-1.26	-1.18
-1.03	-1.02	-.96	-.89	-.62
-.74	-.64	-.53	-.37	0.00
.01	.39	.55	.60	.70
.87	.95	1.03	1.10	1.16
1.27	1.37	1.47	1.55	1.64
1.79	1.93	2.06	2.19	2.29
2.50	2.68	2.85	3.01	3.15
3.41	3.64	3.84	4.02	4.17
4.42	4.61	4.74	4.82	4.85
4.89	4.59	4.25	3.81	3.29
2.70	2.05	1.34	.58	-.24
-1.11	-2.04	-3.02	-4.05	-5.13

```
DATA:

   C      MS     UNK    DEFIS   ETAIS    ALUC    DIANG    DEC    DENIC   RDGL    XGNO   DYGNO    B      COTA
 100.0    99.    50     7650    1.20     635     40.0    1.00    517     750     500     .4     100   .016000

  SUT    YGNO    LENS   SLFRON    SLUPTO    COUPLE    DTCC    PROFILE    ALF    ALFA    YGNOX
   0.    -8.0    0.      0.        0.        0.      .00100    2409      0.0    3.0     8.0

AUXILIAR PARAMETERS CALCULATED BY AIPO7 PROGRAM:

   UN      VISCI    ETAS    DEP     CLU     XCHLP    SU      COTD      RLAND    COFUB     DALF
 2574.00   .1437   17.07  100.90  1035.41  -114.2    1.    .0001000  .027443  .770664    3.0


 YGNO= -8.0     NSSF= 1.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNA

    XCHLP REACHED


 YGNO= -7.6     NSSF= 1.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNA

    XCHLP REACHED


 YGNO= -7.2     NSSF= 1.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNA

    XCHLP REACHED


 YGNO= -6.8     NSSF= 1.000

   S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNA
```

```
 XCHLP REACHED

YGHO= -6.4      NSSF= 1.000
   S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNR
 XCHLP REACHED

YGHO= -6.0      NSSF= 1.000
   S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNR
 XCHLP REACHED

YGHO= -5.6      NSSF= 1.000
   S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNR
 XCHLP REACHED

YGHO= -5.2      NSSF= 1.000
   S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNR
 XCHLP REACHED

YGHO= -4.8      NSSF= 1.000
   S      T     XN     XG     XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN   DYG    REYNR
 XCHLP REACHED
```

```
YCNO= -4.4      NSSF= 1.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
     XCHLP REACHED

YCNO= -4.0      NSSF= 1.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
     XCHLP REACHED

YCNO= -3.6      NSSF= 1.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
     XCHLP REACHED

YCNO= -3.2      NSSF= 1.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
     XCHLP REACHED

YCNO= -2.8      NSSF= 1.000
  S     T     XN     XG     XCN     YCN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
     XCHLP REACHED

YCNO= -2.4      NSSF= 1.000
```

A-4/002.3 Imprenta del INTA

```
 S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
  XGHLP REACHED

YGN0= -2.0     NSSF= 1.000
 S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
  XGHLP REACHED

YGN0= -1.6     NSSF= 1.000
 S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
  XGHLP REACHED

YGN0= -1.2     NSSF= 1.000
 S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
  XGHLP REACHED

YGN0=  -.8     NSSF= 1.000
 S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
  XGHLP REACHED

YGN0=  -.4     NSSF= 1.000
 S    T    XN    XG    XGN    YGN    UXF    UYF    UXG    UYG    DXG    DXGN    DYG    REYNN
 THE DROPLET HITS THE SURFACE.
```

A-1/003.3 Imprenta del INTA

```
YGH01=   -.8000  YGH02=   -.4000

YGH0=  -.8      HSSF= 1.000

 S      T      XH      XC      XCH     YCH     UXF     UYF     UXC     UYC     DXC     DXCH    DYC     REYHH

THE DROPLET HITS THE SURFACE.

YGH0=   .4      HSSF= 1.000

 S      T      XH      XC      XCH     YCH     UXF     UYF     UXC     UYC     DXC     DXCH    DYC     REYHH

THE DROPLET HITS THE SURFACE.

YGH0=   .8      HSSF= 1.000

 S      T      XH      XC      XCH     YCH     UXF     UYF     UXC     UYC     DXC     DXCH    DYC     REYHH

 XCHLP REACHED

YGH03=    .4000  YGH04=    .8000

YGH0=  1.2      HSSF= 1.000

 S      T      XH      XC      XCH     YCH     UXF     UYF     UXC     UYC     DXC     DXCH    DYC     REYHH

 XCHLP REACHED

YGH0=  1.6      HSSF= 1.000

 S      T      XH      XC      XCH     YCH     UXF     UYF     UXC     UYC     DXC     DXCH    DYC     REYHH

 XCHLP REACHED
```

A-1/002.3 Imprenta del INTA

```
YGHO=  2.0     NSSF= 1.000
  S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
   XGNLP REACHED

YGHO=  2.4     NSSF= 1.000
  S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
   XGNLP REACHED

YGHO=  2.8     NSSF= 1.000
  S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
   XGNLP REACHED

YGHO=  3.2     NSSF= 1.000
  S     T     XN     XG     XGN     YGN     UXF     UYF     UYG     UYG     DXG     DXGN     DYG     REYNN
   XGNLP REACHED

YGHO=  3.6     NSSF= 1.000
  S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
   XGNLP REACHED

YGHO=  4.0     NSSF= 1.000
  S     T     XN     XG     XGN     YGN     UXF     UYF     UXG     UYG     DXG     DXGN     DYG     REYNN
```

A-1/002.3 Imprenta del INTA

XCHLP REACHED

YGHO= 4.4 HSSF= 1.000

S T XH XG XGH YGH UXF UYF UXG UYG DXG DXGH DYG REYNH

XCHLP REACHED

YGHO= 4.8 HSSF= 1.000

S T XH XG XGH YGH UXF UYF UXG UYG DXG DXGH DYG REYNH

XCHLP REACHED

YGHO= 5.2 HSSF= 1.000

S T XH XG XGH YGH UXF UYF UXG UYG DXG DXGH DYG REYNH

XCHLP REACHED

YGHO= 5.6 HSSF= 1.000

S T XH XG XGH YGH UXF UYF UXG UYG DXG DXGH DYG REYNH

XCHLP REACHED

YGHO= 6.0 HSSF= 1.000

S T XH XG XGH YGH UXF UYF UXG UYG DXG DXGH DYG REYNH

XCHLP REACHED

A-4/002.3 Imprenta del INTA

```
YGHO=  6.4      NSSF= 1.000

  S      T      XN     XC     XCN    YCN    UXF    UYF    UXC    UYC    DXC    DXCN   DYC    REYNN

   XGHLP REACHED

YGHO=  6.8      NSSF= 1.000

  S      T      XN     XC     XCN    YCN    UXF    UYF    UXC    UYC    DXC    DXCN   DYC    REYNN

   XGHLP REACHED

YGHO=  7.2      NSSF= 1.000

  S      T      XN     XC     XCN    YCN    UXF    UYF    UXC    UYC    DXC    DXCN   DYC    REYNN

   XGHLP REACHED

YGHO=  7.6      NSSF= 1.000

  S      T      XN     XC     XCN    YCN    UXF    UYF    UXC    UYC    DXC    DXCN   DYC    REYNN

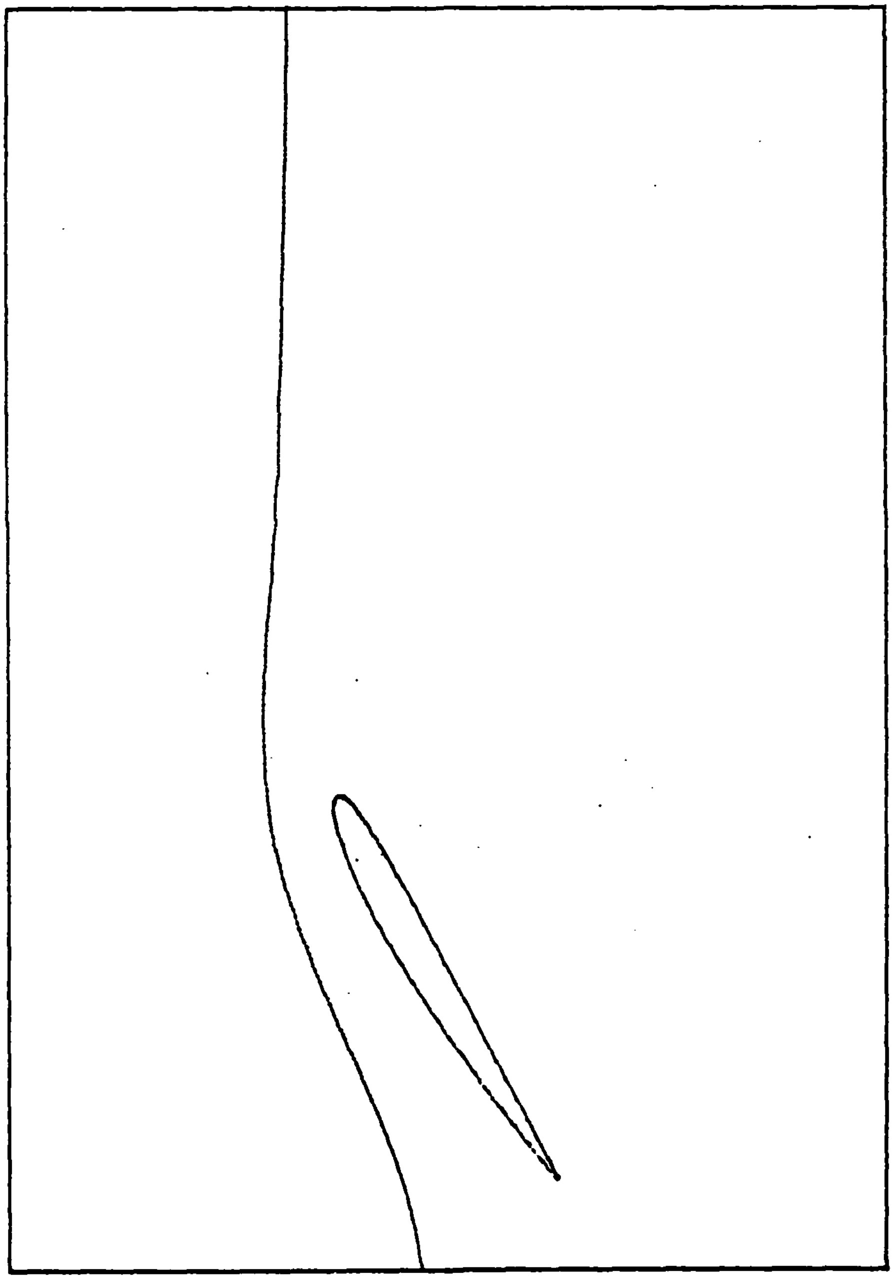
   XGHLP REACHED

YGHO=  8.0      NSSF= 1.000

  S      T      XN     XC     XCN    YCN    UXF    UYF    UXC    UYC    DXC    DXCN   DYC    REYNN

   XGHLP REACHED
```

A-4/008.3 Imprenta del INTA



DATA:

C	NS	UNK	DEFIS	ETAIS	HLUG	DIANG	DEG	DEHIC	RODE	XGNO	.DYGNO	Q	COTA
100.0	99.	10.	7450.	1.20	.635	40.0	1.00	.917	.750	500.	10.	100.	616666

SUT	YGNO	LENG	SLFROM	SLUPTO	COUPLE	DTGC	PROFILE	ALF	ALFA	YGNOX
1.	10.0	1.	396.	404.	0.	.00250	2409	0.0	30.0	120.0

AUXILIAR PARAMETERS CALCULATED BY AIP07 PROGRAM:

WN	VISCI	ETAS	BEP	GLU	XGNLP	SU	COTG	RLAND	COFUS	DALF
314.80	.1437	17.07	100.00	1005.41	-107.7	1.	.0001000	.027449	.770664	30.0

YGNO= 10.0 NSSF= 0.000

S	T	XN	XG	XGN	YGN	UXF	UYF	UXG	UYG	DXG	DXGN	DYG	REYNM
0.	0.00000	0.0	500.000	500.0	10.0000	15.33	.93	15.33	.93	0.00000	-5.00	0.00000	0.002
1.	.00250	1.3	500.038	498.8	10.0023	15.36	.94	15.33	.93	.03832	-1.25	.00233	0.002
2	.00500	2.6	500.076	497.5	10.0047	15.40	.94	15.35	.93	.03838	-1.25	.00233	.002
3.	.00750	3.9	500.115	496.3	10.0070	15.44	.95	15.37	.94	.03840	-1.25	.00234	.001
4.	.01000	5.1	500.153	495.0	10.0094	15.47	.95	15.40	.94	.03846	-1.25	.00235	.001
5.	.01250	6.4	500.192	493.8	10.0117	15.51	.95	15.43	.94	.03853	-1.25	.00236	.002
6.	.01500	7.7	500.230	492.5	10.0141	15.54	.96	15.46	.95	.03861	-1.25	.00237	.002
7.	.01750	9.0	500.269	491.3	10.0165	15.58	.96	15.49	.95	.03869	-1.25	.00238	.002
8.	.02000	10.3	500.308	490.0	10.0188	15.62	.97	15.53	.96	.03878	-1.25	.00239	.002
9.	.02250	11.6	500.347	488.8	10.0212	15.65	.97	15.56	.96	.03887	-1.25	.00240	.002
10.	.02500	12.9	500.385	487.5	10.0237	15.69	.98	15.60	.97	.03896	-1.25	.00241	.002
11.	.02750	14.2	500.425	486.3	10.0261	15.73	.98	15.64	.97	.03905	-1.25	.00242	.002
12.	.03000	15.4	500.464	485.0	10.0285	15.77	.99	15.67	.98	.03914	-1.25	.00243	.002
13.	.03250	16.7	500.503	483.8	10.0309	15.80	.99	15.71	.98	.03923	-1.25	.00244	.002
14.	.03500	18.0	500.542	482.5	10.0334	15.84	1.00	15.75	.98	.03932	-1.25	.00246	.002
15.	.03750	19.3	500.582	481.3	10.0359	15.88	1.00	15.79	.99	.03942	-1.25	.00247	.002
16.	.04000	20.6	500.621	480.0	10.0383	15.92	1.01	15.82	.99	.03951	-1.25	.00248	.002
17.	.04250	21.9	500.661	478.8	10.0408	15.95	1.01	15.86	1.00	.03960	-1.25	.00249	.002
18.	.04500	23.2	500.700	477.5	10.0433	15.99	1.02	15.90	1.00	.03970	-1.25	.00250	.002
19.	.04750	24.5	500.740	476.3	10.0459	16.03	1.02	15.94	1.01	.03979	-1.25	.00251	.002
20.	.05000	25.7	500.780	475.0	10.0484	16.07	1.03	15.97	1.01	.03989	-1.25	.00253	.002
21.	.05250	27.0	500.820	473.8	10.0509	16.11	1.03	16.01	1.02	.03998	-1.25	.00254	.002
22.	.05500	28.3	500.860	472.5	10.0535	16.15	1.04	16.05	1.02	.04008	-1.25	.00255	.002
23	.05750	29.6	500.900	471.3	10.0560	16.19	1.04	16.09	1.03	.04018	-1.25	.00256	.002
24	.06000	30.9	500.941	470.1	10.0586	16.23	1.05	16.13	1.03	.04027	-1.25	.00258	.002
25	.06250	32.2	500.981	468.8	10.0612	16.27	1.05	16.17	1.04	.04037	-1.25	.00259	.002
26.	.06500	33.5	501.021	467.6	10.0638	16.31	1.06	16.21	1.04	.04047	-1.25	.00260	.002
27.	.06750	34.7	501.062	466.3	10.0664	16.35	1.06	16.25	1.05	.04057	-1.25	.00261	.002
28.	.07000	36.0	501.103	465.1	10.0690	16.39	1.07	16.29	1.05	.04067	-1.25	.00263	.002
29.	.07250	37.3	501.143	463.8	10.0717	16.43	1.07	16.33	1.06	.04077	-1.25	.00264	.002
30.	.07500	38.6	501.184	462.6	10.0743	16.47	1.08	16.37	1.06	.04087	-1.25	.00265	.002
31	.07750	39.9	501.225	461.3	10.0770	16.51	1.08	16.41	1.07	.04097	-1.25	.00266	.002

32.	.08000	41.2	501.266	460.1	10.0797	16.55	1.09	16.45	1.07	.04107	-1.25	.00268	.002
33.	.08250	42.5	501.308	458.8	10.0824	16.59	1.09	16.49	1.08	.04117	-1.25	.00269	.002
34.	.08500	43.8	501.349	457.6	10.0851	16.63	1.10	16.53	1.08	.04127	-1.25	.00270	.002
35.	.08750	45.0	501.390	456.3	10.0878	16.67	1.10	16.57	1.09	.04138	-1.25	.00272	.002
36.	.09000	46.3	501.432	455.1	10.0905	16.72	1.11	16.61	1.10	.04148	-1.25	.00273	.002
37.	.09250	47.6	501.473	453.9	10.0933	16.76	1.11	16.65	1.10	.04158	-1.25	.00275	.002
38.	.09500	48.9	501.515	452.6	10.0960	16.80	1.12	16.70	1.11	.04169	-1.25	.00276	.002
39.	.09750	50.2	501.557	451.4	10.0988	16.84	1.13	16.74	1.11	.04179	-1.25	.00277	.002
40.	.10000	51.5	501.599	450.1	10.1016	16.88	1.13	16.78	1.12	.04190	-1.25	.00279	.002
41.	.10250	52.8	501.641	448.9	10.1044	16.93	1.14	16.82	1.12	.04200	-1.24	.00280	.002
42.	.10500	54.1	501.683	447.6	10.1072	16.97	1.14	16.86	1.13	.04211	-1.24	.00282	.002
43.	.10750	55.3	501.725	446.4	10.1100	17.01	1.15	16.91	1.13	.04221	-1.24	.00283	.002
44.	.11000	56.6	501.767	445.1	10.1129	17.06	1.15	16.95	1.14	.04232	-1.24	.00284	.002
45.	.11250	57.9	501.810	443.9	10.1157	17.10	1.16	16.99	1.15	.04243	-1.24	.00286	.002
46.	.11500	59.2	501.852	442.7	10.1186	17.15	1.17	17.04	1.15	.04254	-1.24	.00287	.002
47.	.11750	60.5	501.895	441.4	10.1215	17.19	1.17	17.08	1.16	.04265	-1.24	.00289	.002
48.	.12000	61.8	501.938	440.2	10.1244	17.23	1.18	17.12	1.16	.04276	-1.24	.00290	.002
49.	.12250	63.1	501.981	438.9	10.1273	17.28	1.18	17.17	1.17	.04287	-1.24	.00292	.002
50.	.12500	64.4	502.024	437.7	10.1302	17.32	1.19	17.21	1.18	.04298	-1.24	.00293	.002
51.	.12750	65.6	502.067	436.4	10.1332	17.37	1.20	17.26	1.18	.04309	-1.24	.00295	.002
52.	.13000	66.9	502.110	435.2	10.1362	17.41	1.20	17.30	1.19	.04320	-1.24	.00296	.002
53.	.13250	68.2	502.153	433.9	10.1391	17.46	1.21	17.35	1.19	.04331	-1.24	.00298	.002
54.	.13500	69.5	502.197	432.7	10.1421	17.51	1.22	17.39	1.20	.04342	-1.24	.00299	.002
55.	.13750	70.8	502.240	431.5	10.1451	17.55	1.22	17.44	1.21	.04354	-1.24	.00301	.002
56.	.14000	72.1	502.284	430.2	10.1482	17.60	1.23	17.48	1.21	.04365	-1.24	.00303	.003
57.	.14250	73.4	502.327	429.0	10.1512	17.64	1.24	17.53	1.22	.04377	-1.24	.00304	.003
58.	.14500	74.6	502.371	427.7	10.1543	17.69	1.24	17.58	1.23	.04388	-1.24	.00306	.003
59.	.14750	75.9	502.415	426.5	10.1573	17.74	1.25	17.62	1.23	.04400	-1.24	.00307	.003
60.	.15000	77.2	502.460	425.2	10.1604	17.78	1.26	17.67	1.24	.04411	-1.24	.00309	.003
61.	.15250	78.5	502.504	424.0	10.1635	17.83	1.26	17.72	1.25	.04423	-1.24	.00311	.003
62.	.15500	79.8	502.548	422.8	10.1666	17.88	1.27	17.76	1.25	.04435	-1.24	.00312	.003
63.	.15750	81.1	502.593	421.5	10.1698	17.93	1.28	17.81	1.26	.04446	-1.24	.00314	.003
64.	.16000	82.4	502.637	420.3	10.1729	17.98	1.28	17.86	1.27	.04458	-1.24	.00316	.003
65.	.16250	83.7	502.682	419.0	10.1761	18.02	1.29	17.91	1.27	.04470	-1.24	.00317	.003
66.	.16500	84.9	502.727	417.8	10.1793	18.07	1.30	17.95	1.28	.04482	-1.24	.00319	.003
67.	.16750	86.2	502.772	416.5	10.1825	18.12	1.30	18.00	1.29	.04494	-1.24	.00321	.003
68.	.17000	87.5	502.817	415.3	10.1857	18.17	1.31	18.05	1.29	.04506	-1.24	.00322	.003
69.	.17250	88.8	502.862	414.1	10.1890	18.22	1.32	18.10	1.30	.04519	-1.24	.00324	.003
70.	.17500	90.1	502.907	412.8	10.1922	18.27	1.33	18.15	1.31	.04531	-1.24	.00326	.003
71.	.17750	91.4	502.952	411.6	10.1955	18.32	1.33	18.20	1.31	.04543	-1.24	.00328	.003
72.	.18000	92.7	502.998	410.3	10.1988	18.37	1.34	18.25	1.32	.04556	-1.24	.00330	.003
73.	.18250	94.0	503.044	409.1	10.2021	18.42	1.35	18.30	1.33	.04568	-1.24	.00331	.003
74.	.18500	95.2	503.089	407.9	10.2055	18.47	1.35	18.35	1.34	.04581	-1.24	.00333	.003
75.	.18750	96.5	503.135	406.6	10.2088	18.52	1.36	18.40	1.34	.04593	-1.24	.00335	.003
76.	.19000	97.8	503.181	405.4	10.2122	18.58	1.37	18.45	1.35	.04606	-1.24	.00337	.003
77.	.19250	99.1	503.228	404.1	10.2156	18.63	1.38	18.50	1.36	.04618	-1.24	.00339	.003
78.	.19500	100.4	503.274	402.9	10.2190	18.68	1.38	18.55	1.37	.04631	-1.24	.00341	.003
79.	.19750	101.7	503.320	401.6	10.2224	18.73	1.39	18.60	1.37	.04644	-1.24	.00342	.003
80.	.20000	103.0	503.367	400.4	10.2258	18.78	1.40	18.65	1.38	.04657	-1.24	.00344	.003
81.	.20250	104.2	503.414	399.2	10.2293	18.84	1.41	18.71	1.39	.04670	-1.24	.00346	.003
82.	.20500	105.5	503.461	397.9	10.2328	18.89	1.42	18.76	1.40	.04683	-1.24	.00348	.003
83.	.20750	106.8	503.507	396.7	10.2363	18.94	1.42	18.81	1.40	.04696	-1.24	.00350	.003
84.	.21000	108.1	503.555	395.4	10.2398	19.00	1.43	18.86	1.41	.04709	-1.24	.00352	.003
85.	.21250	109.4	503.602	394.2	10.2433	19.05	1.44	18.92	1.42	.04723	-1.24	.00354	.003
86.	.21500	110.7	503.649	393.0	10.2469	19.11	1.45	18.97	1.43	.04736	-1.24	.00356	.003
87.	.21750	112.0	503.697	391.7	10.2505	19.16	1.46	19.03	1.44	.04750	-1.24	.00358	.003
88.	.22000	113.3	503.744	390.5	10.2541	19.21	1.47	19.08	1.44	.04763	-1.24	.00360	.003
89.	.22250	114.5	503.792	389.2	10.2577	19.27	1.47	19.13	1.45	.04777	-1.24	.00362	.003
90.	.22500	115.8	503.840	388.0	10.2614	19.33	1.48	19.19	1.46	.04790	-1.24	.00364	.003
91.	.22750	117.1	503.888	386.8	10.2650	19.38	1.49	19.24	1.47	.04804	-1.24	.00366	.003

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	.003
93.	.23250	119.7	503.985	384.3	10.2724	19.49	1.51	19.35	1.49	.04832	-1.24	.00371	.003
94.	.23500	121.0	504.033	383.1	10.2761	19.55	1.52	19.41	1.50	.04846	-1.24	.00373	.003
95.	.23750	122.3	504.082	381.8	10.2799	19.61	1.53	19.47	1.50	.04860	-1.24	.00375	.003
96.	.24000	123.6	504.130	380.6	10.2837	19.67	1.54	19.52	1.51	.04874	-1.24	.00377	.003
97.	.24250	124.8	504.179	379.3	10.2875	19.72	1.54	19.58	1.52	.04888	-1.24	.00379	.003
98.	.24500	126.1	504.228	378.1	10.2913	19.78	1.55	19.64	1.53	.04902	-1.24	.00382	.003
99.	.24750	127.4	504.277	376.9	10.2951	19.84	1.56	19.70	1.54	.04917	-1.24	.00384	.003
100.	.25000	128.7	504.327	375.6	10.2990	19.90	1.57	19.75	1.55	.04931	-1.24	.00386	.003
101.	.25250	130.0	504.376	374.4	10.3029	19.96	1.58	19.81	1.56	.04946	-1.24	.00388	.003
102.	.25500	131.3	504.426	373.2	10.3068	20.02	1.59	19.87	1.57	.04960	-1.24	.00391	.003
103.	.25750	132.6	504.476	371.9	10.3107	20.08	1.60	19.93	1.58	.04975	-1.24	.00393	.003
104.	.26000	133.8	504.525	370.7	10.3146	20.14	1.61	19.99	1.59	.04990	-1.24	.00395	.003
105.	.26250	135.1	504.576	369.4	10.3186	20.20	1.62	20.05	1.60	.05005	-1.24	.00398	.003
106.	.26500	136.4	504.626	368.2	10.3226	20.26	1.63	20.11	1.61	.05020	-1.24	.00400	.003
107.	.26750	137.7	504.676	367.0	10.3267	20.32	1.64	20.17	1.62	.05035	-1.24	.00403	.003
108.	.27000	139.0	504.727	365.7	10.3307	20.38	1.65	20.23	1.62	.05050	-1.24	.00405	.003
109.	.27250	140.3	504.777	364.5	10.3348	20.44	1.66	20.29	1.63	.05065	-1.24	.00407	.003
110.	.27500	141.6	504.828	363.3	10.3389	20.51	1.67	20.35	1.64	.05081	-1.24	.00410	.003
111.	.27750	142.9	504.879	362.0	10.3430	20.57	1.68	20.41	1.65	.05096	-1.24	.00412	.003
112.	.28000	144.1	504.930	360.8	10.3471	20.63	1.69	20.48	1.66	.05111	-1.24	.00415	.003
113.	.28250	145.4	504.981	359.6	10.3513	20.70	1.70	20.54	1.67	.05127	-1.24	.00417	.003
114.	.28500	146.7	505.033	358.3	10.3555	20.76	1.71	20.60	1.69	.05143	-1.24	.00420	.003
115.	.28750	148.0	505.084	357.1	10.3597	20.82	1.72	20.67	1.70	.05159	-1.24	.00423	.003
116.	.29000	149.3	505.136	355.8	10.3640	20.89	1.73	20.73	1.71	.05174	-1.24	.00425	.004
117.	.29250	150.6	505.188	354.6	10.3683	20.95	1.74	20.79	1.72	.05190	-1.24	.00428	.004
118.	.29500	151.9	505.240	353.4	10.3726	21.02	1.75	20.86	1.73	.05206	-1.23	.00431	.004
119.	.29750	153.2	505.292	352.1	10.3769	21.09	1.77	20.92	1.74	.05223	-1.23	.00433	.004
120.	.30000	154.4	505.345	350.9	10.3813	21.15	1.78	20.99	1.75	.05239	-1.23	.00436	.004
121.	.30250	155.7	505.397	349.7	10.3857	21.22	1.79	21.05	1.76	.05255	-1.23	.00439	.004
122.	.30500	157.0	505.450	348.4	10.3901	21.29	1.80	21.12	1.77	.05272	-1.23	.00441	.004
123.	.30750	158.3	505.503	347.2	10.3945	21.35	1.81	21.19	1.78	.05288	-1.23	.00444	.004
124.	.31000	159.6	505.556	346.0	10.3990	21.42	1.82	21.25	1.79	.05305	-1.23	.00447	.004
125.	.31250	160.9	505.609	344.7	10.4035	21.49	1.83	21.32	1.80	.05322	-1.23	.00450	.004
126.	.31500	162.2	505.662	343.5	10.4080	21.56	1.85	21.39	1.82	.05339	-1.23	.00453	.004
127.	.31750	163.4	505.716	342.3	10.4126	21.63	1.86	21.46	1.83	.05356	-1.23	.00456	.004
128.	.32000	164.7	505.770	341.0	10.4171	21.70	1.87	21.53	1.84	.05373	-1.23	.00458	.004
129.	.32250	166.0	505.824	339.8	10.4218	21.77	1.88	21.59	1.85	.05390	-1.23	.00461	.004
130.	.32500	167.3	505.878	338.6	10.4264	21.84	1.89	21.66	1.86	.05407	-1.23	.00464	.004
131.	.32750	168.6	505.932	337.3	10.4311	21.91	1.91	21.73	1.88	.05425	-1.23	.00467	.004
132.	.33000	169.9	505.986	336.1	10.4358	21.98	1.92	21.80	1.89	.05442	-1.23	.00470	.004
133.	.33250	171.2	506.041	334.9	10.4405	22.05	1.93	21.87	1.90	.05460	-1.23	.00474	.004
134.	.33500	172.5	506.096	333.6	10.4453	22.12	1.94	21.95	1.91	.05478	-1.23	.00477	.004
135.	.33750	173.7	506.151	332.4	10.4501	22.20	1.96	22.02	1.93	.05495	-1.23	.00480	.004
136.	.34000	175.0	506.206	331.2	10.4549	22.27	1.97	22.09	1.94	.05513	-1.23	.00483	.004
137.	.34250	176.3	506.261	329.9	10.4598	22.34	1.98	22.16	1.95	.05531	-1.23	.00486	.004
138.	.34500	177.6	506.317	328.7	10.4647	22.42	2.00	22.24	1.96	.05550	-1.23	.00489	.004
139.	.34750	178.9	506.372	327.5	10.4696	22.49	2.01	22.31	1.98	.05568	-1.23	.00493	.004
140.	.35000	180.2	506.428	326.2	10.4746	22.57	2.02	22.38	1.99	.05586	-1.23	.00496	.004
141.	.35250	181.5	506.484	325.0	10.4795	22.64	2.04	22.46	2.00	.05605	-1.23	.00499	.004
142.	.35500	182.8	506.540	323.8	10.4846	22.72	2.05	22.53	2.02	.05624	-1.23	.00502	.004
143.	.35750	184.0	506.597	322.6	10.4896	22.80	2.06	22.61	2.03	.05642	-1.23	.00506	.004
144.	.36000	185.3	506.653	321.3	10.4947	22.87	2.08	22.68	2.04	.05661	-1.23	.00509	.004
145.	.36250	186.6	506.710	320.1	10.4998	22.95	2.09	22.76	2.06	.05680	-1.23	.00513	.004
146.	.36500	187.9	506.767	318.9	10.5050	23.03	2.11	22.84	2.07	.05700	-1.23	.00516	.004
147.	.36750	189.2	506.824	317.6	10.5102	23.11	2.12	22.91	2.09	.05719	-1.23	.00520	.004
148.	.37000	190.5	506.882	316.4	10.5154	23.19	2.14	22.99	2.10	.05738	-1.23	.00523	.004
149.	.37250	191.8	506.939	315.2	10.5207	23.27	2.15	23.07	2.11	.05758	-1.23	.00527	.004
150.	.37500	193.0	506.997	313.9	10.5260	23.35	2.17	23.15	2.13	.05778	-1.23	.00530	.004
151.	.37750	194.3	507.055	312.7	10.5313	23.43	2.18	23.23	2.14	.05797	-1.23	.00534	.004

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152.	.30000	195.6	307.113	311.5	10.5367	23.51	2.20	23.31	2.16	.05817	-1.23	.00538	.004
153.	.30250	196.9	307.172	310.3	10.5421	23.59	2.21	23.39	2.17	.05837	-1.23	.00541	.004
154.	.30500	198.2	307.230	309.0	10.5476	23.67	2.23	23.47	2.19	.05858	-1.23	.00545	.004
155.	.30750	199.5	307.289	307.8	10.5531	23.76	2.24	23.55	2.20	.05878	-1.23	.00549	.005
156.	.31000	200.8	307.348	306.6	10.5586	23.84	2.26	23.64	2.22	.05898	-1.23	.00553	.005
157.	.31250	202.1	307.407	305.3	10.5642	23.93	2.27	23.72	2.24	.05919	-1.23	.00557	.005
158.	.31500	203.3	307.467	304.1	10.5698	24.01	2.29	23.80	2.25	.05940	-1.23	.00561	.005
159.	.31750	204.6	307.526	302.9	10.5754	24.10	2.31	23.89	2.27	.05961	-1.23	.00565	.005
160.	.40000	205.9	307.586	301.7	10.5811	24.18	2.32	23.97	2.28	.05982	-1.23	.00569	.005
161.	.40250	207.2	307.646	300.4	10.5868	24.27	2.34	24.05	2.30	.06003	-1.23	.00573	.005
162.	.40500	208.5	307.706	299.2	10.5926	24.36	2.36	24.14	2.32	.06024	-1.23	.00577	.005
163.	.40750	209.8	307.767	298.0	10.5984	24.44	2.37	24.23	2.33	.06046	-1.23	.00581	.005
164.	.41000	211.1	307.827	296.8	10.6043	24.53	2.39	24.31	2.35	.06068	-1.23	.00585	.005
165	.41250	212.4	307.888	295.5	10.6102	24.62	2.41	24.40	2.37	.06089	-1.23	.00589	.005
166.	.41500	213.6	307.949	294.3	10.6161	24.71	2.43	24.49	2.38	.06111	-1.23	.00594	.005
167.	.41750	214.9	308.011	293.1	10.6221	24.80	2.44	24.58	2.40	.06133	-1.23	.00598	.005
168.	.42000	216.2	308.072	291.9	10.6281	24.89	2.46	24.67	2.42	.06156	-1.23	.00602	.005
169.	.42250	217.5	308.134	290.6	10.6342	24.98	2.48	24.76	2.44	.06178	-1.23	.00607	.005
170.	.42500	218.8	308.196	289.4	10.6403	25.08	2.50	24.85	2.45	.06201	-1.22	.00611	.005
171.	.42750	220.1	308.258	288.2	10.6465	25.17	2.52	24.94	2.47	.06223	-1.22	.00616	.005
172	.43000	221.4	308.321	287.0	10.6527	25.26	2.54	25.03	2.49	.06246	-1.22	.00620	.005
173.	.43250	222.7	308.384	285.7	10.6589	25.36	2.56	25.12	2.51	.06269	-1.22	.00625	.005
174.	.43500	223.9	308.446	284.5	10.6652	25.45	2.58	25.22	2.53	.06293	-1.22	.00630	.005
175.	.43750	225.2	308.510	283.3	10.6716	25.55	2.59	25.31	2.55	.06316	-1.22	.00634	.005
176.	.44000	226.5	308.573	282.1	10.6779	25.64	2.61	25.41	2.57	.06340	-1.22	.00639	.005
177.	.44250	227.8	308.637	280.8	10.6844	25.74	2.63	25.50	2.59	.06363	-1.22	.00644	.005
178	.44500	229.1	308.701	279.6	10.6909	25.84	2.65	25.60	2.61	.06387	-1.22	.00649	.005
179.	.44750	230.4	308.765	278.4	10.6974	25.94	2.67	25.69	2.63	.06411	-1.22	.00654	.005
180.	.45000	231.7	308.829	277.2	10.7040	26.04	2.70	25.79	2.65	.06436	-1.22	.00659	.005
181.	.45250	232.9	308.894	275.9	10.7106	26.14	2.72	25.89	2.67	.06460	-1.22	.00664	.005
182.	.45500	234.2	308.958	274.7	10.7173	26.24	2.74	25.99	2.69	.06485	-1.22	.00669	.005
183.	.45750	235.5	309.023	273.5	10.7241	26.34	2.76	26.09	2.71	.06510	-1.22	.00674	.006
184.	.46000	236.8	309.089	272.3	10.7309	26.44	2.78	26.19	2.73	.06535	-1.22	.00679	.006
185.	.46250	238.1	309.154	271.1	10.7377	26.54	2.80	26.29	2.75	.06560	-1.22	.00685	.006
186.	.46500	239.4	309.220	269.8	10.7446	26.65	2.82	26.39	2.77	.06585	-1.22	.00690	.006
187.	.46750	240.7	309.286	268.6	10.7516	26.75	2.85	26.49	2.79	.06611	-1.22	.00695	.006
188.	.47000	242.0	309.353	267.4	10.7586	26.86	2.87	26.60	2.81	.06636	-1.22	.00701	.006
189.	.47250	243.2	309.419	266.2	10.7656	26.96	2.89	26.70	2.84	.06662	-1.22	.00706	.006
190.	.47500	244.5	309.486	265.0	10.7727	27.07	2.92	26.81	2.86	.06689	-1.22	.00712	.006
191.	.47750	245.8	309.553	263.7	10.7799	27.18	2.94	26.91	2.88	.06715	-1.22	.00718	.006
192.	.48000	247.1	309.621	262.5	10.7872	27.29	2.96	27.02	2.90	.06741	-1.22	.00723	.006
193.	.48250	248.4	309.689	261.3	10.7944	27.40	2.99	27.13	2.93	.06768	-1.22	.00729	.006
194.	.48500	249.7	309.757	260.1	10.8018	27.51	3.01	27.23	2.95	.06795	-1.22	.00735	.006
195.	.48750	251.0	309.825	258.9	10.8092	27.62	3.04	27.34	2.98	.06822	-1.22	.00741	.006
196.	.49000	252.3	309.893	257.6	10.8167	27.73	3.06	27.45	3.00	.06850	-1.22	.00747	.006
197.	.49250	253.5	309.962	256.4	10.8242	27.84	3.09	27.56	3.02	.06877	-1.22	.00753	.006
198.	.49500	254.8	310.031	255.2	10.8318	27.96	3.11	27.68	3.05	.06905	-1.22	.00759	.006
199.	.49750	256.1	310.100	254.0	10.8394	28.07	3.14	27.79	3.07	.06933	-1.22	.00765	.006
200.	.50000	257.4	310.170	252.8	10.8472	28.19	3.16	27.90	3.10	.06961	-1.22	.00772	.006
201.	.50250	258.7	310.240	251.6	10.8549	28.30	3.19	28.02	3.12	.06990	-1.22	.00778	.006
202.	.50500	260.0	310.310	250.3	10.8628	28.42	3.22	28.13	3.15	.07019	-1.22	.00784	.006
203.	.50750	261.3	310.381	249.1	10.8707	28.54	3.24	28.25	3.18	.07048	-1.22	.00791	.006
204.	.51000	262.5	310.451	247.9	10.8787	28.66	3.27	28.37	3.20	.07077	-1.22	.00798	.007
205	.51250	263.8	310.522	246.7	10.8867	28.78	3.30	28.48	3.23	.07106	-1.22	.00804	.007
206	.51500	265.1	310.594	245.5	10.8948	28.90	3.33	28.60	3.26	.07136	-1.22	.00811	.007
207.	.51750	266.4	310.665	244.3	10.9030	29.02	3.35	28.72	3.29	.07166	-1.22	.00818	.007
208.	.52000	267.7	310.737	243.0	10.9112	29.15	3.38	28.84	3.31	.07196	-1.22	.00825	.007
209.	.52250	269.0	310.810	241.8	10.9196	29.27	3.41	28.97	3.34	.07226	-1.21	.00832	.007
210.	.52500	270.3	310.882	240.6	10.9280	29.40	3.44	29.09	3.37	.07257	-1.21	.00839	.007
211.	.52750	271.6	310.955	239.4	10.9364	29.52	3.47	29.21	3.40	.07288	-1.21	.00846	.007

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212.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
213.	.53250	274.1	511.102	237.0	10.9536	29.78	3.53	29.46	3.46	.07350	-1.21	.00861	.007
214.	.53500	275.4	511.176	235.0	10.9623	29.91	3.56	29.59	3.49	.07382	-1.21	.00868	.007
215.	.53750	276.7	511.250	234.5	10.9710	30.04	3.60	29.72	3.52	.07414	-1.21	.00876	.007
216.	.54000	278.0	511.324	233.3	10.9798	30.17	3.63	29.85	3.55	.07446	-1.21	.00884	.007
217.	.54250	279.3	511.399	232.1	10.9888	30.30	3.66	29.98	3.58	.07478	-1.21	.00892	.007
218.	.54500	280.6	511.474	230.9	10.9978	30.44	3.69	30.11	3.61	.07511	-1.21	.00899	.007
219.	.54750	281.9	511.549	229.7	11.0068	30.57	3.73	30.24	3.65	.07544	-1.21	.00907	.007
220.	.55000	283.1	511.625	228.5	11.0160	30.70	3.76	30.37	3.68	.07577	-1.21	.00916	.007
221.	.55250	284.4	511.701	227.3	11.0252	30.84	3.79	30.50	3.71	.07610	-1.21	.00924	.007
222.	.55500	285.7	511.778	226.1	11.0345	30.98	3.83	30.64	3.74	.07643	-1.21	.00932	.007
223.	.55750	287.0	511.855	224.9	11.0440	31.12	3.86	30.77	3.78	.07677	-1.21	.00940	.008
224.	.56000	288.3	511.932	223.6	11.0534	31.26	3.90	30.91	3.81	.07711	-1.21	.00949	.008
225.	.56250	289.6	512.009	222.4	11.0630	31.40	3.94	31.05	3.85	.07745	-1.21	.00958	.008
226.	.56500	290.9	512.087	221.2	11.0727	31.54	3.97	31.19	3.88	.07780	-1.21	.00966	.008
227.	.56750	292.1	512.165	220.0	11.0824	31.69	4.01	31.33	3.92	.07816	-1.21	.00975	.008
228.	.57000	293.4	512.243	218.8	11.0923	31.83	4.05	31.48	3.96	.07851	-1.21	.00984	.008
229.	.57250	294.7	512.322	217.6	11.1022	31.98	4.08	31.62	3.99	.07887	-1.21	.00993	.008
230.	.57500	296.0	512.402	216.4	11.1122	32.13	4.12	31.77	4.03	.07923	-1.21	.01003	.008
231.	.57750	297.3	512.481	215.2	11.1224	32.28	4.16	31.91	4.07	.07960	-1.21	.01012	.008
232.	.58000	298.6	512.561	214.0	11.1326	32.43	4.20	32.06	4.11	.07997	-1.21	.01022	.008
233.	.58250	299.9	512.641	212.8	11.1429	32.59	4.24	32.21	4.14	.08034	-1.21	.01031	.008
234.	.58500	301.2	512.722	211.6	11.1533	32.74	4.28	32.36	4.18	.08072	-1.21	.01041	.008
235.	.58750	302.4	512.803	210.4	11.1638	32.90	4.32	32.51	4.22	.08110	-1.21	.01051	.009
236.	.59000	303.7	512.885	209.2	11.1744	33.05	4.37	32.67	4.26	.08148	-1.21	.01061	.009
237.	.59250	305.0	512.966	207.9	11.1851	33.21	4.41	32.82	4.31	.08186	-1.21	.01071	.009
238.	.59500	306.3	513.049	206.7	11.1959	33.37	4.45	32.98	4.35	.08225	-1.20	.01082	.009
239.	.59750	307.6	513.131	205.5	11.2069	33.53	4.50	33.14	4.39	.08265	-1.20	.01092	.009
240.	.60000	308.9	513.214	204.3	11.2179	33.70	4.54	33.30	4.43	.08304	-1.20	.01103	.009
241.	.60250	310.2	513.298	203.1	11.2290	33.86	4.59	33.46	4.48	.08344	-1.20	.01114	.009
242.	.60500	311.5	513.382	201.9	11.2403	34.03	4.63	33.62	4.52	.08385	-1.20	.01125	.009
243.	.60750	312.7	513.466	200.7	11.2516	34.20	4.68	33.78	4.57	.08426	-1.20	.01136	.009
244.	.61000	314.0	513.551	199.5	11.2631	34.36	4.73	33.95	4.61	.08467	-1.20	.01147	.009
245.	.61250	315.3	513.636	198.3	11.2747	34.54	4.77	34.12	4.66	.08508	-1.20	.01159	.009
246.	.61500	316.6	513.721	197.1	11.2864	34.71	4.82	34.29	4.70	.08550	-1.20	.01170	.010
247.	.61750	317.9	513.807	195.9	11.2982	34.88	4.87	34.46	4.75	.08593	-1.20	.01182	.010
248.	.62000	319.2	513.893	194.7	11.3102	35.06	4.92	34.63	4.80	.08635	-1.20	.01194	.010
249.	.62250	320.5	513.980	193.5	11.3222	35.24	4.97	34.80	4.85	.08679	-1.20	.01206	.010
250.	.62500	321.7	514.068	192.3	11.3344	35.42	5.02	34.98	4.90	.08722	-1.20	.01219	.010
251.	.62750	323.0	514.155	191.1	11.3467	35.60	5.08	35.15	4.95	.08766	-1.20	.01231	.010
252.	.63000	324.3	514.243	189.9	11.3592	35.78	5.13	35.33	5.00	.08811	-1.20	.01244	.010
253.	.63250	325.6	514.332	188.7	11.3717	35.96	5.18	35.51	5.05	.08856	-1.20	.01257	.010
254.	.63500	326.9	514.421	187.5	11.3844	36.15	5.24	35.69	5.11	.08901	-1.20	.01270	.010
255.	.63750	328.2	514.510	186.3	11.3972	36.34	5.29	35.88	5.16	.08947	-1.20	.01283	.010
256.	.64000	329.5	514.600	185.1	11.4102	36.53	5.35	36.06	5.21	.08993	-1.20	.01297	.011
257.	.64250	330.8	514.691	183.9	11.4233	36.72	5.41	36.25	5.27	.09039	-1.20	.01310	.011
258.	.64500	332.0	514.782	182.7	11.4366	36.92	5.47	36.44	5.33	.09087	-1.20	.01324	.011
259.	.64750	333.3	514.873	181.5	11.4500	37.11	5.53	36.63	5.38	.09134	-1.20	.01339	.011
260.	.65000	334.6	514.965	180.3	11.4635	37.31	5.59	36.83	5.44	.09182	-1.20	.01353	.011
261.	.65250	335.9	515.057	179.2	11.4772	37.51	5.65	37.02	5.50	.09231	-1.19	.01368	.011
262.	.65500	337.2	515.150	178.0	11.4910	37.71	5.71	37.22	5.56	.09280	-1.19	.01383	.011
263.	.65750	338.5	515.243	176.8	11.5050	37.92	5.77	37.42	5.62	.09329	-1.19	.01398	.011
264.	.66000	339.8	515.337	175.6	11.5191	38.12	5.84	37.62	5.68	.09380	-1.19	.01413	.011
265.	.66250	341.1	515.431	174.4	11.5334	38.33	5.90	37.82	5.75	.09430	-1.19	.01429	.012
266.	.66500	342.3	515.526	173.2	11.5478	38.54	5.97	38.03	5.81	.09481	-1.19	.01444	.012
267.	.66750	343.6	515.621	172.0	11.5624	38.76	6.04	38.24	5.87	.09532	-1.19	.01461	.012
268.	.67000	344.9	515.717	170.8	11.5772	38.97	6.11	38.45	5.94	.09585	-1.19	.01477	.012
269.	.67250	346.2	515.814	169.6	11.5921	39.19	6.18	38.66	6.01	.09638	-1.19	.01494	.012
270.	.67500	347.5	515.910	168.4	11.6072	39.41	6.25	38.87	6.08	.09691	-1.19	.01511	.012
271.	.67750	348.8	516.008	167.2	11.6225	39.63	6.32	39.09	6.15	.09745	-1.19	.01528	.012

272.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
273.	.68250	351.3	516.204	164.5	11.6536	40.08	6.47	39.53	6.29	.09854	-1.19	.01563	.013
274.	.68500	352.6	516.304	163.7	11.6694	40.31	6.55	39.75	6.36	.09910	-1.19	.01581	.013
275.	.68750	353.9	516.403	162.8	11.6854	40.54	6.62	39.98	6.44	.09966	-1.19	.01600	.013
276.	.69000	355.2	516.503	161.3	11.7016	40.78	6.70	40.21	6.51	.10023	-1.19	.01619	.013
277.	.69250	356.5	516.604	160.1	11.7180	41.02	6.78	40.44	6.59	.10080	-1.19	.01638	.013
278.	.69500	357.8	516.706	158.9	11.7345	41.26	6.87	40.67	6.67	.10138	-1.19	.01657	.013
279.	.69750	359.1	516.808	157.7	11.7513	41.50	6.95	40.91	6.75	.10197	-1.19	.01677	.014
280.	.70000	360.4	516.910	156.6	11.7683	41.74	7.03	41.14	6.83	.10256	-1.18	.01697	.014
281.	.70250	361.6	517.013	155.4	11.7855	41.99	7.12	41.39	6.91	.10316	-1.18	.01717	.014
282.	.70500	362.9	517.117	154.2	11.8028	42.24	7.21	41.63	6.99	.10377	-1.18	.01738	.014
283.	.70750	364.2	517.221	153.0	11.8204	42.50	7.30	41.88	7.08	.10438	-1.18	.01759	.014
284.	.71000	365.5	517.326	151.8	11.8382	42.75	7.39	42.13	7.17	.10500	-1.18	.01781	.014
285.	.71250	366.8	517.432	150.6	11.8563	43.01	7.48	42.38	7.26	.10563	-1.18	.01803	.015
286.	.71500	368.1	517.538	149.5	11.8745	43.27	7.58	42.63	7.35	.10626	-1.18	.01825	.015
287.	.71750	369.4	517.645	148.3	11.8930	43.54	7.67	42.89	7.44	.10690	-1.18	.01848	.015
288.	.72000	370.7	517.753	147.1	11.9117	43.81	7.77	43.15	7.53	.10755	-1.18	.01871	.015
289.	.72250	371.9	517.861	145.9	11.9307	44.08	7.87	43.42	7.63	.10821	-1.18	.01895	.015
290.	.72500	373.2	517.970	144.7	11.9499	44.35	7.97	43.68	7.73	.10887	-1.18	.01919	.015
291.	.72750	374.5	518.079	143.6	11.9693	44.60	8.07	43.95	7.82	.10954	-1.18	.01944	.016
292.	.73000	375.8	518.189	142.4	11.9890	44.88	8.18	44.21	7.92	.11020	-1.18	.01969	.015
293.	.73250	377.1	518.300	141.2	12.0089	45.17	8.29	44.48	8.03	.11087	-1.18	.01994	.016
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296.	.74001	380.9	518.637	137.7	12.0703	46.04	8.62	45.32	8.35	.11296	-1.17	.02073	.017
297.	.74251	382.2	518.751	136.5	12.0913	46.34	8.74	45.61	8.46	.11367	-1.17	.02101	.017
298.	.74501	383.5	518.865	135.3	12.1126	46.64	8.86	45.91	8.57	.11440	-1.17	.02129	.017
299.	.74751	384.8	518.980	134.2	12.1342	46.95	8.98	46.20	8.69	.11513	-1.17	.02157	.017
300.	.75001	386.1	519.096	133.0	12.1561	47.26	9.10	46.50	8.81	.11588	-1.17	.02187	.017
301.	.75251	387.4	519.213	131.8	12.1782	47.57	9.23	46.81	8.93	.11664	-1.17	.02216	.018
302.	.75501	388.7	519.330	130.7	12.2007	47.89	9.36	47.11	9.05	.11740	-1.17	.02247	.018
303.	.75751	390.0	519.448	129.5	12.2235	48.21	9.49	47.43	9.17	.11817	-1.17	.02278	.018
304.	.76001	391.2	519.567	128.3	12.2466	48.53	9.63	47.74	9.30	.11896	-1.17	.02309	.018
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307.	.76751	395.1	519.929	124.8	12.3178	49.53	10.05	48.71	9.70	.12137	-1.17	.02408	.019
308.	.77001	396.4	520.051	123.7	12.3422	49.88	10.19	49.04	9.84	.12219	-1.16	.02443	.019
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313.	.78251	402.8	520.675	117.8	12.4698	51.65	10.97	50.77	10.58	.12647	-1.16	.02626	.021
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315.	.78751	405.4	520.930	115.5	12.5235	52.40	11.31	51.49	10.90	.12826	-1.16	.02705	.022
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322.	.80501	414.4	521.854	107.4	12.7243	55.12	12.61	54.12	12.13	.13481	-1.15	.03010	.024
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328.	.82001	422.1	522.684	100.5	12.9158	57.71	13.92	56.62	13.37	.14101	-1.15	.03314	.026
329.	.82251	423.4	522.826	99.4	12.9495	58.16	14.16	57.06	13.59	.14209	-1.14	.03369	.027
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331.	.82751	426.0	523.114	97.1	13.0186	59.08	14.65	57.95	14.05	.14431	-1.14	.03484	.027

332.	.83001	427.3	523.289	96.0	13.0840	59.56	14.90	58.41	14.29	.14545	-1.14	.03543	.028
333.	.83251	428.6	523.406	94.8	13.0900	59.97	15.16	58.87	14.54	.14660	-1.14	.03604	.028
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345.	.86251	444.0	525.259	81.2	13.5760	66.20	18.90	64.84	18.04	.16142	-1.13	.04468	.034
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348.	.87001	447.9	525.752	77.9	13.7152	67.96	20.05	66.52	19.12	.16559	-1.12	.04733	.037
349.	.87251	449.2	525.919	76.8	13.7635	68.57	20.46	67.10	19.49	.16703	-1.12	.04826	.038
350.	.87501	450.4	526.087	75.6	13.8127	69.18	20.88	67.69	19.89	.16850	-1.12	.04923	.038
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352.	.88001	453.0	526.429	73.4	13.9142	70.21	21.72	68.90	20.70	.17150	-1.12	.05124	.040
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354.	.88501	455.6	526.776	71.2	14.0190	71.50	22.65	70.00	21.55	.17426	-1.11	.05332	.036
355.	.88751	456.9	526.952	70.1	14.0742	72.16	23.14	70.60	21.99	.17576	-1.11	.05443	.041
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360.	.90001	463.3	527.854	64.5	14.3643	75.31	25.78	73.88	24.48	.18385	-1.10	.06054	.047
361.	.90251	464.6	528.040	63.4	14.4261	76.02	26.37	74.42	25.00	.18538	-1.10	.06185	.044
362.	.90501	465.9	528.226	62.3	14.4893	76.74	26.98	75.09	25.56	.18689	-1.10	.06320	.044
363.	.90751	467.2	528.415	61.2	14.5539	77.48	27.62	75.75	26.13	.18855	-1.10	.06462	.048
364.	.91001	468.5	528.605	60.1	14.6200	78.22	28.27	76.45	26.73	.19026	-1.10	.06609	.049
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367.	.91751	472.3	529.187	56.9	14.8276	80.17	30.30	78.47	28.63	.19546	-1.09	.07079	.050
368.	.92001	473.6	529.384	55.8	14.9000	80.95	31.05	79.18	29.31	.19706	-1.09	.07243	.050
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376.	.94001	483.9	531.022	47.1	15.5462	83.47	36.60	84.67	35.61	.21071	-1.08	.08788	.063
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386.	.96501	496.8	533.127	36.3	16.5192	42.27	23.06	68.87	35.50	.19874	-1.10	.09672	.467
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388.	.97001	499.4	533.421	34.1	16.6730	32.15	18.74	49.89	26.94	.13521	-1.15	.07197	.525
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394.   .98501   307.1  533.898   26.8  16.9600    6.11   7.76  17.43  12.04   .04786  -1.24  .03394   .264
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A-4/068.3 Imprenta del INTA

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    UXF=         -27.890812
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    UXG=         -14.204197
    UYG=          -2.050337
    BXG=           -.031610
    BXGN=         -1.318610
    BYG=           -.004642
```

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REYNM= .872026

403.	1.00751	518.7	533.079	15.2	17.0536	-29.70	-12.62	-20.68	-6.62	-.04361	-1.33	-.01183	.292

T= 1.007511
XN= 518.657350
XG= 533.079036
XGN= 15.218200
YGN= 17.053608
UXF= -29.704002
UYF= -12.621431
UXG= -20.682941
UYG= -6.619261
DXG= -.043609
DXGN= -1.330609
DYG= -.011047
REYNM= .292037

404.	1.01001	519.9	533.023	13.9	17.0344	-31.64	-14.46	-23.68	-8.74	-.05545	-1.34	-.01919	.291

T= 1.010011
XN= 519.944340
XG= 533.023610
XGN= 13.075759
YGN= 17.034416
UXF= -31.642536
UYF= -14.456736
UXG= -23.676136
UYG= -8.735374
DXG= -.055449
DXGN= -1.342449
DYG= -.019193
REYNM= .291132

405.	1.01251	521.2	533.760	12.8	17.0096	-40.00	-20.52	-27.04	-11.14	-.06339	-1.35	-.02404	.207
406.	1.01501	522.5	533.688	11.2	16.9764	-47.70	-26.27	-33.04	-15.42	-.07509	-1.36	-.03326	.361
407.	1.01751	523.8	533.594	9.8	16.9321	-49.62	-28.63	-39.30	-19.59	-.09042	-1.38	-.04427	.392
408.	1.02001	525.1	533.491	8.4	16.8780	-57.74	-35.94	-43.05	-23.29	-.10293	-1.39	-.05411	.332
409.	1.02251	526.4	533.375	7.0	16.8125	-65.11	-42.62	-49.91	-29.14	-.11620	-1.40	-.06553	.363
410.	1.02501	527.7	533.243	5.6	16.7326	-72.59	-50.65	-56.18	-34.74	-.13262	-1.42	-.07984	.449
411.	1.02751	529.0	533.093	4.1	16.6370	-79.51	-58.48	-63.31	-41.77	-.14937	-1.44	-.09563	.473
412.	1.03001	530.2	532.926	2.7	16.5237	-86.13	-66.97	-70.08	-48.85	-.16674	-1.45	-.11320	.507
413.	1.03251	531.5	532.743	1.2	16.3917	-87.43	-71.37	-76.86	-56.73	-.18367	-1.47	-.13190	.516
414.	1.03501	532.8	532.546	-.3	16.2420	-93.31	-81.26	-80.60	-62.41	-.19683	-1.48	-.14892	.442
415.	1.03751	534.1	532.337	-1.8	16.0759	-98.43	-92.03	-86.35	-71.12	-.20869	-1.50	-.16691	.442
416.	1.04001	535.4	532.115	-3.3	15.8868	-103.00	-101.63	-91.20	-80.15	-.22194	-1.51	-.18909	.525
417.	1.04251	536.7	531.881	-4.8	15.6740	-106.88	-111.66	-96.14	-89.42	-.23418	-1.52	-.21197	.526
418.	1.04501	538.0	531.635	-6.3	15.4392	-109.58	-122.05	-100.47	-99.00	-.24577	-1.53	-.23562	.533
419.	1.04751	[illegible]	[illegible]	-7.9	[illegible]	-106.87	-132.33	-104.39	-109.90	-.25897	-1.54	[illegible]	[illegible]
420.	1.05001	[illegible]	531.118	-9.4	14.8939	-107.93	-142.02	-104.49	-119.11	-.26099	-1.58	[illegible]	[illegible]
421.	1.05251	541.8	[illegible]	-11.0	14.5832	-104.45	-149.91	-106.17	-129.40	-.26333	-1.55	-.31444	.511
422.	1.05501	543.1	530.591	-12.5	14.2493	-100.36	-156.71	-104.88	-137.74	-.26382	-1.55	-.33392	.474
423.	1.05751	544.4	530.332	-14.1	13.8949	-95.70	-163.16	-102.90	-145.74	-.25972	-1.55	-.35435	.424
424.	1.06001	545.7	530.078	-15.6	13.5216	-88.82	-170.65	-99.68	-152.95	-.25322	-1.54	-.37337	.413
425.	1.06251	547.0	529.838	-17.1	13.1297	-83.26	-176.96	-94.80	-160.55	-.24310	-1.53	-.39100	.434
426.	1.06501	548.3	529.604	-18.7	12.7205	-77.43	-181.01	-90.01	-166.79	-.23102	-1.52	-.40918	.435
427.	1.06751	549.6	529.386	-20.2	12.2962	-71.37	-185.49	-84.62	-172.69	-.21829	-1.51	-.42435	.410

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428.	1.07001	550.8	529.101	-21.7	11.8579	-64.59	-189.81	-79.02	-177.89	-.20456	-1.49	-.43823	.408
429.	1.07251	552.1	528.992	-23.1	11.4071	-58.28	-193.36	-72.82	-182.80	-.18981	-1.48	-.45007	.402
430.	1.07501	553.4	528.817	-24.6	10.9440	-51.92	-196.49	-66.73	-187.05	-.17444	-1.46	-.46221	.397
431.	1.07751	554.7	528.650	-26.0	10.4724	-45.19	-199.37	-60.46	-190.87	-.15899	-1.45	-.47239	.383
432.	1.08001	556.0	528.515	-27.5	9.9909	-38.83	-201.72	-53.98	-194.29	-.14305	-1.43	-.48145	.380
433.	1.08251	557.3	528.330	-28.9	9.5015	-32.25	-203.81	-47.63	-197.25	-.12701	-1.41	-.48943	.371
434.	1.08501	558.6	528.277	-30.3	9.0051	-25.97	-205.49	-41.11	-199.87	-.11092	-1.40	-.49640	.363
435.	1.08751	559.9	528.182	-31.7	8.5026	-19.57	-206.90	-34.77	-202.08	-.09485	-1.38	-.50244	.355
436.	1.09001	561.1	528.104	-33.0	7.9951	-13.20	-208.01	-28.35	-203.99	-.07889	-1.37	-.50759	.346
437	1.09251	562.4	528.041	-34.4	7.4832	-7.23	-208.81	-22.02	-205.53	-.06296	-1.35	-.51190	.341
438.	1.09501	563.7	527.993	-35.7	6.9670	-1.17	-209.38	-15.83	-206.79	-.04731	-1.33	-.51540	.331
439.	1.09751	565.0	527.961	-37.0	6.4495	4.77	-209.70	-9.67	-207.77	-.03187	-1.32	-.51821	.324
440.	1.10001	566.3	527.945	-38.3	5.9292	10.51	-209.78	-3.62	-208.49	-.01662	-1.30	-.52034	.318
441.	1.10251	567.6	527.943	-39.6	5.4074	16.19	-209.67	2.28	-208.96	-.00160	-1.29	-.52182	.310
442.	1.10501	568.8	527.956	-40.9	4.8847	21.78	-209.37	8.10	-209.20	.01298	-1.27	-.52270	.304
443.	1.10751	570.1	527.983	-42.2	4.3617	27.16	-208.87	13.81	-209.22	.02740	-1.26	-.52303	.296
444.	1.11001	571.4	528.025	-43.4	3.8388	32.43	-208.22	19.37	-209.04	.04149	-1.25	-.52283	.292
445.	1.11251	572.7	528.080	-44.6	3.3167	37.61	-207.41	24.81	-208.67	.05523	-1.23	-.52215	.285
446.	1.11501	574.0	528.149	-45.9	2.7957	42.63	-206.46	30.14	-208.13	.06869	-1.22	-.52101	.281
447.	1.11751	575.3	528.231	-47.1	2.2762	47.56	-205.37	35.33	-207.43	.08185	-1.21	-.51945	.275
448.	1.12001	576.6	528.325	-48.3	1.7587	52.34	-204.15	40.41	-206.57	.09460	-1.19	-.51749	.276
449.	1.12251	577.9	528.432	-49.4	1.2436	57.01	-202.82	45.36	-205.57	.10722	-1.18	-.51517	.266
450.	1.12501	579.1	528.552	-50.6	.7310	61.56	-201.37	50.19	-204.44	.11944	-1.17	-.51251	.261
451.	1.12751	580.4	528.683	-51.8	.2215	65.99	-199.83	54.90	-203.18	.13137	-1.16	-.50952	.257
452.	1.13001	581.7	528.826	-52.9	-.2847	70.32	-198.18	59.49	-201.81	.14300	-1.14	-.50624	.253
453.	1.13251	583.0	528.980	-54.0	-.7874	74.54	-196.44	63.97	-200.33	.15433	-1.13	-.50267	.250
454.	1.13501	584.3	529.146	-55.2	-1.2862	78.60	-194.61	68.34	-198.74	.16539	-1.12	-.49864	.246
455.	1.13751	585.6	529.322	-56.3	-1.7810	82.60	-192.69	72.57	-197.06	.17613	-1.11	-.49476	.242
456.	1.14001	586.9	529.509	-57.4	-2.2714	86.50	-190.69	76.71	-195.29	.18660	-1.10	-.49044	.239
457.	1.14251	588.2	529.705	-58.5	-2.7573	90.29	-188.62	80.74	-193.39	.19682	-1.09	-.48585	.236
458.	1.14501	589.4	529.912	-59.5	-3.2383	93.90	-186.48	84.68	-191.43	.20677	-1.08	-.48102	.233
459.	1.14751	590.7	530.129	-60.6	-3.7143	97.49	-184.26	88.46	-189.39	.21642	-1.07	-.47603	.230
460.	1.15001	592.0	530.354	-61.7	-4.1852	100.98	-181.97	92.18	-187.28	.22581	-1.06	-.47084	.227
461.	1.15251	593.3	530.589	-62.7	-4.6506	104.37	-179.61	95.80	-185.09	.23490	-1.05	-.46546	.225
462.	1.15501	594.6	530.833	-63.8	-5.1105	107.56	-177.20	99.32	-182.84	.24389	-1.04	-.45991	.222
463.	1.15751	595.9	531.086	-64.8	-5.5647	110.75	-174.71	102.69	-180.52	.25251	-1.03	-.45419	.219
464.	1.16001	597.2	531.347	-65.8	-6.0130	113.84	-172.17	106.00	-178.13	.26086	-1.03	-.44830	.217
465.	1.16251	598.5	531.616	-66.8	-6.4553	116.83	-169.56	109.21	-175.67	.26901	-1.02	-.44225	.215
466	1.16501	599.7	531.893	-67.8	-6.8913	119.61	-166.91	112.33	-173.15	.27692	-1.01	-.43603	.213
467.	1.16751	601.0	532.177	-68.9	-7.3210	122.39	-164.20	115.29	-170.59	.28452	-1.00	-.42967	.210
468.	1.17001	602.3	532.469	-69.8	-7.7441	125.08	-161.42	118.20	-167.95	.29186	-1.00	-.42317	.206
469.	1.17251	603.6	532.768	-70.8	-8.1607	127.66	-158.60	121.00	-165.26	.29900	-.99	-.41652	.207
470.	1.17501	604.9	533.074	-71.8	-8.5704	130.02	-155.74	123.71	-162.52	.30589	-.98	-.40972	.206
471.	1.17752	606.2	533.387	-72.8	-8.9732	132.39	-152.82	126.27	-159.73	.31247	-.97	-.40280	.203
472.	1.18002	607.5	533.705	-73.8	-9.3689	134.65	-149.86	128.76	-156.88	.31879	-.97	-.39576	.201
473.	1.18252	608.7	534.030	-74.7	-9.7575	136.88	-146.83	131.18	-153.90	.32489	-.96	-.38858	.200
474.	1.18502	610.0	534.361	-75.7	-10.138	138.84	-143.80	133.44	-151.04	.33074	-.96	-.38120	.199
475.	1.18752	611.3	534.697	-76.6	-10.512	140.77	-140.71	135.63	-148.05	.33634	-.95	-.37387	.198
476.	1.19002	612.6	535.039	-77.6	-10.879	142.58	-137.59	137.71	-145.02	.34167	-.95	-.36635	.196
477.	1.19252	613.9	535.386	-78.5	-11.237	144.28	-134.43	139.67	-141.96	.34673	-.94	-.35872	.194
478.	1.19502	615.2	535.737	-79.4	-11.588	145.62	-131.29	141.50	-138.85	.35146	-.94	-.35101	.193
479.	1.19752	616.5	536.093	-80.4	-11.932	147.08	-128.08	143.11	-135.74	.35576	-.93	-.34323	.194
480	1.20002	617.8	536.452	-81.3	-12.267	148.42	-124.85	144.70	-132.87	.35977	-.93	-.33539	.166
481	1.20252	619.0	536.816	-82.2	-12.594	149.64	-121.60	146.17	-129.39	.36360	-.92	-.32748	.166
482.	1.20502	620.3	537.183	-83.2	-12.914	150.74	-118.35	147.55	-126.18	.36715	-.92	-.31946	.166
483.	1.20752	621.6	537.554	-84.1	-13.225	151.70	-115.08	148.80	-122.95	.37044	-.92	-.31140	.165
484.	1.21002	622.9	537.927	-85.0	-13.529	152.54	-111.81	149.95	-119.70	.37344	-.91	-.30331	.183
485	1.21252	624.2	538.303	-85.9	-13.824	153.26	-108.84	150.97	-116.45	.37614	-.91	-.29519	.182
486.	1.21502	625.5	538.682	-86.8	-14.111	153.85	-105.28	151.86	-113.19	.37854	-.91	-.28705	.180
487	1.21752	626.8	539.062	-87.7	-14.390	154.11	-102.04	152.64	-109.91	.38062	-.91	[illegible]	[illegible]

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488.	1.22002	628.1	539.445	-88.6	-14.660	154.65	-98.01	153.29	-106.60	.38240	-.90	-.27077	.176
489.	1.22252	629.3	539.829	-89.5	-14.923	154.87	-95.41	153.81	-103.44	.38387	-.90	-.26265	.175
490.	1.22502	630.6	540.214	-90.4	-15.178	154.96	-92.43	154.21	-100.22	.38502	-.90	-.25457	.173
491.	1.22752	631.9	540.600	-91.3	-15.424	154.93	-89.30	154.49	-97.02	.38587	-.90	-.24654	.171
492.	1.23002	633.2	540.986	-92.2	-15.663	154.79	-86.20	154.64	-93.84	.38641	-.90	-.23857	.169
493.	1.23252	634.5	541.373	-93.1	-15.893	154.53	-83.14	154.68	-90.70	.38665	-.90	-.23068	.167
494.	1.23502	635.8	541.759	-94.0	-16.116	154.17	-80.14	154.60	-87.60	.38659	-.90	-.22288	.165
495.	1.23752	637.1	542.145	-94.9	-16.332	153.69	-77.20	154.40	-84.54	.38625	-.90	-.21517	.163
496.	1.24002	638.3	542.531	-95.8	-16.539	153.11	-74.31	154.09	-81.53	.38562	-.90	-.20759	.161
497	1.24252	639.6	542.916	-96.7	-16.739	152.44	-71.49	153.68	-79.57	.38471	-.90	-.20013	.159
498	1.24502	640.9	543.299	-97.6	-16.932	151.68	-68.73	153.16	-73.67	.38355	-.90	-.19281	.157
499	1.24752	642.2	543.681	-98.5	-17.118	150.83	-66.05	152.55	-72.83	.38213	-.90	-.18563	.155
500.	1.25002	643.5	544.062	-99.4	-17.296	149.89	-63.43	151.84	-70.06	.38048	-.91	-.17862	.153
501.	1.25252	644.8	544.440	-100.3	-17.468	148.89	-60.90	151.04	-67.35	.37859	-.91	-.17177	.151
502.	1.25502	646.1	544.817	-101.3	-17.633	147.81	-58.44	150.16	-64.72	.37649	-.91	-.16509	.149
503.	1.25752	647.4	545.191	-102.2	-17.792	146.67	-56.06	149.20	-62.16	.37419	-.91	-.15860	.147
504.	1.26002	648.6	545.563	-103.1	-17.944	145.47	-53.76	148.17	-59.68	.37171	-.92	-.15229	.145
505.	1.26252	649.9	545.932	-104.0	-18.090	144.22	-51.53	147.07	-57.27	.36905	-.92	-.14618	.143
506.	1.26502	651.2	546.298	-104.9	-18.230	142.92	-49.39	145.91	-54.94	.36623	-.92	-.14026	.141
507.	1.26752	652.5	546.661	-105.8	-18.365	141.58	-47.33	144.70	-52.69	.36327	-.92	-.13453	.138
508.	1.27002	653.8	547.022	-106.8	-18.494	140.21	-45.35	143.44	-50.51	.36017	-.93	-.12900	.136
509.	1.27252	655.1	547.378	-107.7	-18.618	138.81	-43.45	142.13	-48.42	.35696	-.93	-.12367	.134
510.	1.27502	656.4	547.732	-107.7	-18.736	137.38	-41.62	140.79	-46.41	.35365	-.93	-.11854	.132

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SUMMARY

The information presented in this Final Scientific Report can be summarized as follows:

1.- One Mathematical Model has been established, determining the absolute motion of the droplets composing a cloud when an infinitely long body, whose arbitrary cross section is defined by up to 100 points, moves inside it, normally to its infinite span, and that, in addition, determines the trajectories described by these droplets, with respect to the profile limiting the cross section.

One parameter, nominated NSSF, has been included in the program to take into account the possibility of attenuate the effect, in the calculation of the air velocity, of the defining segments that are non sighted from the point where the air velocity is being cálculated.

The Mathematical Model includes the expression that determines the ice growing in the case F.F.=1 .

2.- One FORTRAN Program has been developed in base to that Mathematical Model. This Program, nominated AIP07 (Aircraft Icing Processes, NO.7), permits in both,Manual and Automatic modes, to obtain the trajectories of the droplets with respect to the profile, presented in a normalized pattern at any desired angle of attack. The values of 13 different variables implicated in the calculations are printed, if so desired, step by step, along each trajectory.

When starting, the values of up to 24 parameters that determine the process and display of results are to be given to the computer by conversation with it using the adequate peripheric.

As a result, the AIP07 Program presents a

great versatility.

In Manual Mode the initial ordenate of each trajectory is to be selected by the operator. On the contrary, in Automatic Mode all the trajectories are executed automatically by the computer according to the data given by the operator before running the program.

3.- Ten sets of trajectories, generated by the NACA 2409 profile, are presented in order to show some of the huge number of possibilities, concerning operation and display, yielded by the AIP07 FORTRAN Program.

The value of the NSSF parameter, ranging from zero to one can be selected for each trajectory, or set of trajectories, and it is printed at the beginning of the tabulation, following the initial ordenate of each trajectory.

The sheet that presents each set of drawn trajectories is followed by the printed sheets containing the corresponding data and results. These results can be the tabulation (if desired) step by step of the values of the 13 mentioned variables and information concerning if the droplet hits the surface of the profile or if the dot that, on the paper, represents the droplet reaches the left hand side of the drawing.

CONCLUSIONS

1.- The information presented in this Final Scientific Report leads to the conclusion that the Primary Aim of the proposal denominated "Aircraft Icing Processes", submitted to the European Office of Aerospace Research and Development in February 1983, producing Grant.NO.AFOSR 83-0340, has been reached.

2.- The AIPO7 FORTRAN Program, elaborated under that Proposal, has provisions to be expanded in order to reach new targets.

Torrejón de Ardoz, 7 November 1984

The Principal Investigator

-Ernesto Montiel R.-

VºBº

EL DIRECTOR DEL DEPARTAMENTO DE

AERODINAMICA Y NAVEGABILIDAD

-José Warleta Carrillo-

Warleta

MINISTERIO DE DEFENSA
INSTITUTO NACIONAL DE TECNICA AEROESPACIAL "ESTEBAN TERRADAS"
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